THE
METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

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Electro-Platers' Convention in Montreal

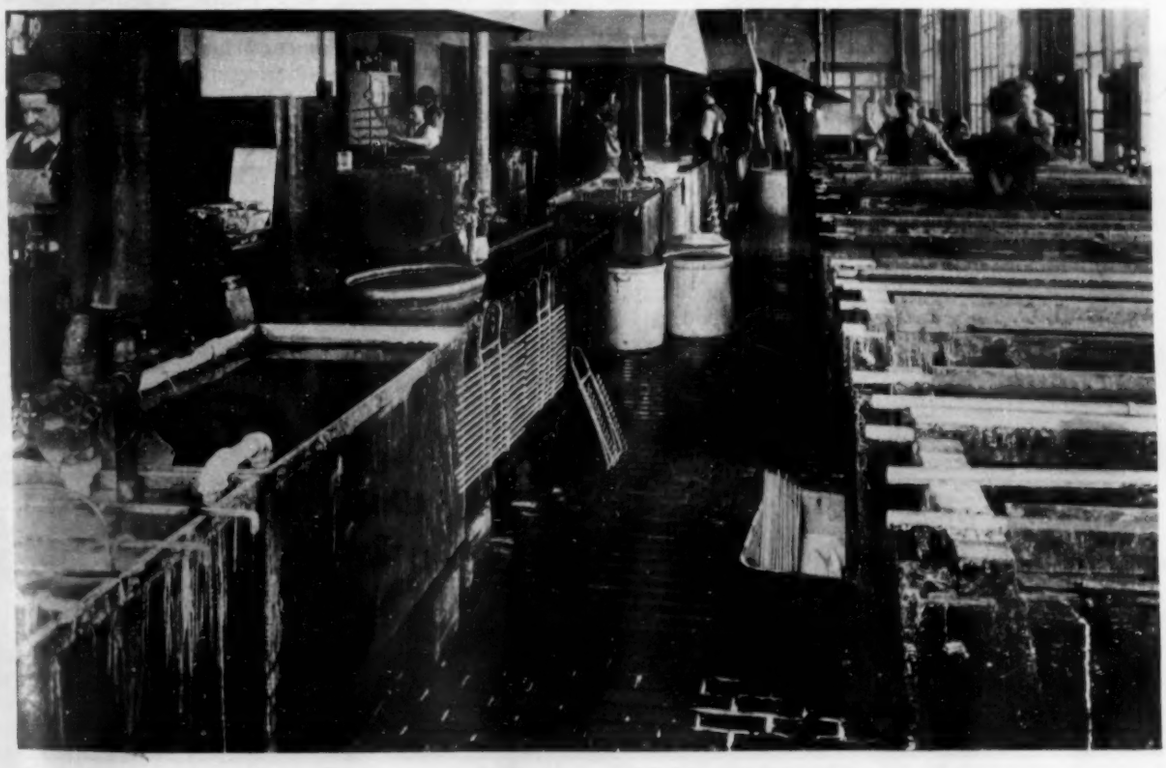
A Description of the Plating Industry of Montreal, Canada, and Advance Information About the Thirteenth Annual Convention, June 29-July 2, 1925

Written for The Metal Industry by PETER W. BLAIR, Montreal, Canada

On May 18, 1642, a little company of brave men and women founded the settlement which has since grown into Montreal the great Canadian metropolis. The founding of Montreal was an act of religious enthusiasm. The city came into existence as the expression of a purpose formed, seemingly without collusion, in the minds of three men in France in the early 17th century. The story of how these men, Jerome le Royer de la Dauversiere, M. Pierre Chevrier, Baron de Fauchamp, and M. Olier, came together and carried their purpose to fruition, lacks few of the elements of romance. These three men in 1640, formed the Society of Notre Dame de Montreal for the purpose of furthering the evangelization of the Indians.

The question of a suitable leader occasioned the Society of Notre Dame not a little anxiety but, as in many another crisis, in human history, the work called for the man. The man was Paul de Chomedy, Sieure de Maisonneuve.

Early in 1641 the little expedition was ready, and after attending worship in the Church of Notre Dame in Paris, de Chomedy and his companions boarded the three vessels which were to bear them across the stormy Atlantic to a new and strange land. The voyage was not without inci-



PLATING PLANT OF THE NORTHERN ELECTRIC COMPANY

dent. Three times the boat carrying de Chomedy had to turn back because of her leaky condition. In consequence, his vessel was the last to reach Quebec, and it must have been a glad day when the company was reunited at Sillery, just above Quebec.

During the winter of 1641-42 the little company was busy preparing for the momentous journey in the spring as soon as the river was clear of ice. Finally on May 8, 1642, a little fleet of four vessels set sail from Quebec bearing the brave band of pioneers under their enthusiastic leader. The personnel of that group merits more than passing mention. Next to Maisonneuve himself, the outstanding figure was a beautiful cultured woman, whose physical frailty belied a spirit of dauntless courage and unfailing kindliness. This was Mademoiselle Jeanne Mance, mother of the new settlement, whose tender care of the sick and discouraged meant so much in those early days of stress and loneliness. There were also Father Poncet, the first missionary to Ville Marie, and twenty-one colonists. With them also were de Montmagny, Father Vilmon, Madame de la Peltrie, head of the Ursuline Convent at Quebec, her maid Charlotte Barre, all of whom had come to witness the beginning of the new venture.

Later in the afternoon of May 17th, the little flotilla anchored in sight of its goal, and early next day proceeded along the shore of the island until, passing the mouth of a small stream which emptied into the St. Lawrence, it drew to land near a stretch of meadow land skirting the larger river. This was the place which Maisonneuve had decided on his earlier visit to be the best site for his settlement. It was indeed, a beautiful spot, with the mighty St. Lawrence lapping its sshores, while in the background the land gently rose to the wooded slopes of Mount Royal. On this spot Montreal was founded.

Tradition has always played an important part in the life of every Canadian community. Montreal is no exception, being true to type. Its background of tradition springs from the sturdy stock of its founders. Yet Montreal has recognized the fact that the problem of its pioneers is not the problem of the present generation. Therefore it prides itself on the element which has contributed to its growth and prosperity and has kept pace with modern tendencies in its commercial, industrial and civic life. In short, Montreal has caught the progressiveness of the West.

As every city becomes prosperous and successful it develops a character, almost a personality, peculiarly its own. This is true also of Montreal because it has developed evenly on all sides, with no feature over-emphasized and none neglected. This development is perhaps due, to some extent, to its geographical position and particularly to the quality of its citizenship. Montreal is a city of 850,000 population and is a central terminal for all railroad traffic from the United States and steamship traffic to all the leading European ports. Montreal has erected some very beautiful and artistic structures. One of these is the Mount Royal Hotel where the Convention will be held. The entire ninth floor will be devoted to convention purposes, including exhibits, committee meetings and general meetings.

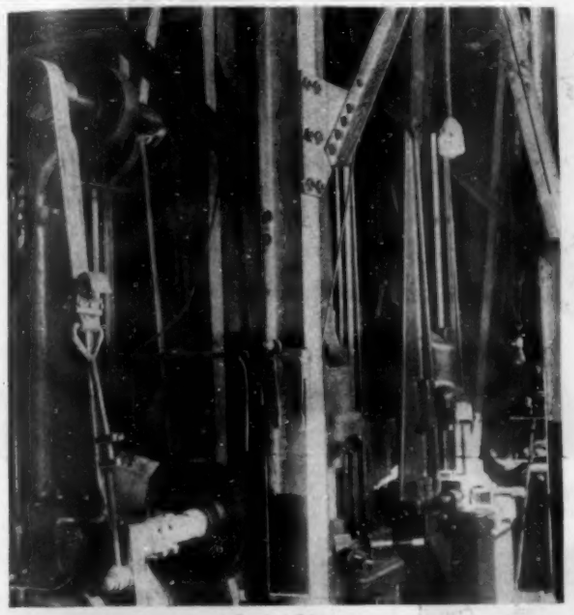
Education plays an important part in the life of the community and Montreal prides itself in having the best educational system in the country. Its public school system is divided into elementary school, junior and senior high school. It is also fortunate in having two very interesting colleges, McGill and the College of Montreal, whose graduates are scattered throughout the entire world in the engineering, medical and legal professions. Montreal was very fortunate also in securing the approval of the Shriners for one of their hospitals for crippled children, which has recently been opened.

Industrially Montreal is very well known as it has some of the largest plants in Canada, such as the Steel Company of Canada, the Canadian Car Company of Canada and the Angus Shops of the Canadian Pacific Railroad which has its own up-to-date plating plant. Several American concerns in metal manufacturing lines have plants established here, incorporated under the laws of Canada. Chief among them are the Jenkins Company, Ltd. manufacturer of brass and iron valves and engineering specialties; Crane Company Ltd., Simmons Bedstead Company, Ltd., which have polishing and Plating Departments. The Northern Electric Company, manufacturer of electrical equipment is another pioneer plant and has one of the most complete plating and polishing plants in the city. This plant is designed along the same lines as the Western Electric Company plant at Hawthorne, Chicago, Ill. The

SILVER PLATING PLANT OF MAPPIN & WEBB, MONTREAL, CANADA

Gillette Safety Razor Company, Ltd. of Canada specializes in gold, silver and nickel plating.

One of the oldest concerns in the manufacture of metal goods in Montreal is the Robert Mitchell Company, Ltd. Neil Hepburn is the foreman plater. This company was founded in 1851 by the late Robert Mitchell, grandfather of the present managing director, Allan M. Mitchell. The business was started in the plumbing goods line in a small factory on St. Henry street. It was later moved to the corner of Craig and Bleury streets, and established in the Witness Building. By 1887 the manufacturing end of the business had become so large that a new plant was built at the corner of Dominion and Albert streets, St. Cunegonde Ward. This plant was destroyed by fire in



PRESSES IN SILVER FACTORY OF HENRY BIRKS, LTD.,

1902 and the present commodious quarters which cover the whole block bounded by St. Antoine, Rose de Lima, St. James, and Belair avenues were built.

The company continued in the plumbing goods line until about 1908 when its business in railroad hardware became so great that it was thought advisable to drop the plumbing goods. Gas and electric lighting fixtures also formed a large part of the output in the early days and a special fixture department is now maintained by the company wherein specially designed fixtures are made. The fixtures which are to be seen in the public rooms of the Mount Royal Hotel such as the rotunda, various dining rooms and ball room are all the products of this company. Other lines manufactured by the company include memorial tablets, brass railings, brass letters, church fixtures and architectural bronze work generally. The polishing and plating departments are of course essential to work of this nature and the company maintains an up-to-date and well equipped department for this varied line of products.

Visitors to the convention will be gladly welcomed to the plant of the Robert Mitchell Company, Ltd.

Montreal for years has taken great pride in its manufacturing jewelry and silversmith plants and the men at their heads are most decidedly leaders in Montreal's business and financial life. The names of Birks, Mappin and Caron stand for honor, integrity and financial stability.

In 1879, only twelve years after the Dominion of Canada came into being, Henry Birks founded his first store at 222 St. James street, Montreal. It was an unpreentious little shop compared with the seven large and well-stocked establishments in which he still takes a lively personal interest today.

As the years passed Birks grew up with Canada. It is now an institution of national significance—yet its sound, old fashioned ideals have never changed. Henry Birks & Sons now operate stores in Vancouver, Calgary, Winnipeg, Ottawa, Halifax and Toronto (Ryrie-Birks, Ltd.).

VETERAN SILVERSMITHS

Walter Denman arrived in Montreal with his parents at the age of two years from London, England, in the year 1857 and has resided in Montreal since that date. He learned the silversmith trade with his father in a small shop that he operated and now retires after fifty years of continuous service as foreman of the flatware department of Henry Birks Sons, Ltd., taking up his residence at his country home in the suburbs.

The following employees of the shops of this company, retired or still in active service as silver or goldsmiths make up a total of over 400 years of service. Practically all have been associated with Birks since boyhood.

Joseph Allard, 1584 St. Hubert street, whose connection with the craft borders on a half century, he being in his 48th year as a master silversmith.

George A. Simpson, 335 Mance street, master craftsman of nearly fifty years, from whose skilled hands have come many of Birks gem-set pieces.

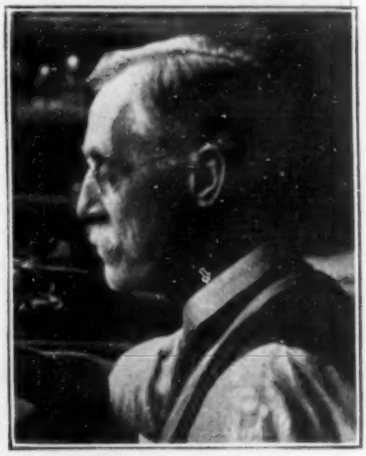
Fred Yates, 322 Mackay street. A quarter of a century of experience guides his skilled fingers.

John Walsh, 1757 Esplanade avenue, foreman, who has spent 30 years as a silversmith.

Arthur Richards, 143 Querbes avenue, Outremont, who has entered his fourth decade as a silver craftsman with the firm.

E. Sutton, 370 Rosedale avenue, who has been a member of Birks staff of skilled artisans for 24 years.

John Leslie, 4270 Western avenue, Westmount, was formerly veteran head of Birks Silver Craftshop. His lifetime service was recently rewarded with a directorship in the firm. Albert Dumouchel, his assistant for years, relieved him of active responsibility. Mr. Dumouchel, 1288 St. Hubert street, general manager of Birks Silver Factory, and stockholder in the company, was recently promoted after 51 years at his craft.



WALTER DENMAN

Dolphin Archambault, of 61 Mentena street, prides himself on over 47 years as a silversmith. His father-in-law, the late Albert Disrocher, completed 50 years as a silversmith before him.

When John Newton Mappin first opened his little silversmith's workshop at Sheffield in 1810, no one could have foreseen that within a hundred years his name would become famous as a silversmith on every continent of the globe. Yet, this is what has happened. In 1913, when his descendants decided to open the present branch in Montreal, the company—for the expansion of business had

necessitated the incorporation of the firm in 1908—had already established itself in many of the great capitals of the world. And here in Montreal, no less than in Buenos Aires or Rome or Johannesburg, or any of the other fifteen branches, the name of Mappin and Webb has become a household word. For it is not so much by the art of their purely decorative creations, nor the beauty of their imported articles that they have won their position, as by the excellence of their table ware. Prince's Plate is said to rival in its permanence Sterling silver itself. Manufactured in the Royal Works at Sheffield, where over a thousand men are employed, and carried to the fifteen Mappin and Webb branches, for distribution to homes in every part of the world, it has played a noteworthy part in world trade. With this example before them, the Canadian company decided to follow the Mappin and Webb traditions, and create for themselves an honored name in the plating industry.

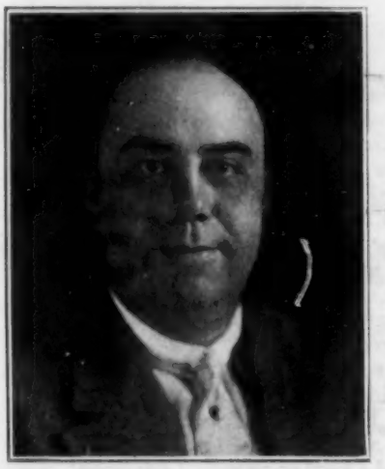
Mappin and Webb extend a very cordial welcome to all who may visit Montreal, to visit their showrooms at 353 St. Catherine street.

Their are a number of job plating plants in Montreal, plating jewelry, silverware, automobile parts and in fact everything that comes their way. Chief among these is the three-story factory located at 411 Aylmer St. and operated by J. H. Feeley with all modern equipment. Mr. Feeley is one of the active members of the Montreal Branch and one of the live wires; also Chairman of the Convention Committee. He is well known to all who have attended past conventions. The Royal Silver Plate Company, 48 Craig St. specializes in silver plate and church ornaments. Rubenstein Brothers, 41 Craig St., established since 1864, have a finely equipped plant and exhibit their product at the Provincial Exhibitions and have received medals of merit for their exhibits. Other job shops are as follows: The Electro-Plating & Silversmith Company, Ltd., 1961 Bleury St.; Fred Benzies, 922 Charlevoix St.; Lymburnery Company, Inc., 1025 Boyer St.; Delfosse & Cie, 7 Hermine St.; William Scully, 320 University St.

Another large concern is the Cuthbert Brass Works which also maintains a finely equipped plating and polishing establishment and specializes in plumbers and sanitary goods. Peter Graham is the superintendent.

James Robertson Company, Ltd., manufacturer of plumbers' supplies and sanitary goods with branches throughout the Dominion, has a plant in Montreal with a well equipped plating department.

SUPREME OFFICERS OF THE AMERICAN ELECTRO-PLATERS' SOCITY



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OFFICIAL PROGRAM

(An official Bulletin Board—which should be consulted daily—will be placed in Hotel Lobby)

MONDAY, JUNE 29TH

8.00 A. M. Registration.
All members and guests are requested to register as early as possible and obtain official badge and convention tickets.

Important

Don't overlook new faces in your excitement of meeting all the "old timers."

10.00 A. M. Meeting of Executive Board in Secretary's quarters.

11.00 A M. Meeting of Credential Committee.

2.00 P. M. Convention called to order by Chairman of Committee, John H. Feeley, Montreal, Canada.
Address of Welcome by representative of City of Montreal.
Address by representative of the Board of Trade.
Address by Chas. H. Proctor, founder of American Electro-Platers' Society.
Address by Past Supreme President John E. Sterling, New York City.
Response by Supreme President Frank J. Hanlon, Chicago, Ill.
Convention open for business.
Annual address by Supreme President Frank J. Hanlon.
Minutes of last regular meeting.
Reports of Officers.
Appointing of Committees by Supreme President.
Presentation and reading of all resolutions.

8.00 P. M. Meeting called to order by Supreme President, who will introduce the gentlemen who have so kindly offered papers.

TUESDAY, JUNE 30TH

8.30 A. M. Business Session.

11.00 A. M. Papers—Technical Session.

2.00 P. M. Business Session.

3.30 P. M. Paper by Dr. William Blum, U. S. Bureau of Standards.

8.00 P. M. Papers—Technical Session.

WEDNESDAY, JULY 1ST

8.30 A. M. Business Session.

10.30 A. M. Meeting of delegates and visitors on McGill University Campus—Sherbrooke Street (two blocks from Hotel.)

10.45 A. M. Official Photograph.
(Please be on time, as it is our desire to have everyone included.)

11.00 A. M. Baseball Game.

UNITED STATES OF AMERICA
(International Champions.)
vs.
CANADA

2.00 P. M. Motor Bus drive.
(Sightseeing Harbor Front.)

6.30 P. M. Banquet, Entertainment and Dance.
(This is our Dominion Day—corresponding with July 4th. A very good time will be provided.)

THURSDAY, JULY 2ND

9.00 A. M. Business Session. Reports of Committees.
Election of Officers.
Selection of Convention City for 1926.
Adjournment.

2.00 P. M. Visiting of Plants and Points of Interest.
(Do not leave selection until last minute, but arrange with committee in charge beforehand what you wish to see.)

8.00 P. M. Moonlight Excursion.
Introduction of Newly Elected Officers.
Prizes for Papers and Exhibits.
Dancing.

TRANSPORTATION ACCOMMODATION

The Grand Trunk Railway System has been chosen as the route for members, delegates and visitors, and the "International Limited" has been selected as the official train leaving Chicago as per schedule below. The schedule as shown will permit spending six hours in Toronto, using steamer down the St. Lawrence to Montreal:

Lv. Chicago 5.30 P. M. (Cent. Time), Fri., June 26th.—Grand Trunk.
Ar. Toronto 8.40 A. M. (East. Time), Sat., June 27th.—Grand Trunk.
Lv. Toronto 3.00 P. M. (East. Time), Sat., June 27th.—Can. SS. Lines.
Ar. Montreal 5.45 P. M. (East. Time), Sun. June 28th.—Can. SS. Lines.

The round-trip fare Chicago to Montreal, including steamer, is $48.60.

In connection with traveling from New York, "The Montrealer" which leaves from Pennsylvania Station, daily, and operates via the Hell Gate Bridge route, New York, New Haven and Hartford Railroad, Springfield, Boston and Maine Railroad, Windsor, Central Vermont Railway, St. John and Canadian National Railway to Montreal, on the following schedule and carries through Pullman sleeping cars:

Lv. New York (Pennsylvania Station), 7.30 P. M.—Eastern Standard Time.
Ar. Bridgeport 9:05 P. M.
Ar. New Haven 9:37 P. M.
Ar. Hartford 10:33 P. M.
Ar. Springfield 11:25 P. M.
Ar. St. Albans 6:09 A. M.
Due Montreal (Bonaventure Station), 8.05 A. M.—Eastern Standard Time.

The one way ticket fare from New York to Montreal is $14.01. The round trip excursion ticket fare, going and returning via the above route, is $22.42. The Pullman fare from New York to Montreal is—lower berth $3.75, upper $3.00.

Returning, "The Washingtonian" leaves Montreal (Bonaventure Station), at 8.15 P. M. and is due New York (Pennsylvania Station), at 8.40 A. M. (Eastern Standard Time).

Trains from the Grand Central Station, New York.

Delaware & Hudson. Leave 9:45 P. M. Arrive 7:50 A. M. Eastern Standard Time.

Leave 8:45 A. M. Arrive 8:40 P. M. Eastern Standard Time.

These trains travel west of Lake Champlain.

Rutland Railroad. Leave 8:50 P. M. Arrive 7:50 A. M. Eastern Standard Time.

Leave 8:45 A. M. Arrive 9:15 P. M. Eastern Standard Time.

These trains travel east of Lake Champlain.

New York Central. Leave 7:10 P. M. Arrive about 9 A. M. Eastern Standard Time.

This train travels via the Adirondacks.

Visitors from Newark can make connections at Philadelphia or New York.

Etching Cutlery

A Detailed Article on the Methods and Chemicals Used in Etching Steel Knives.

Written for The Metal Industry by JOSEPH HAAS, Assistant Superintendent, Ontario Silver Co., Muncie, Ind.

The general principles of etching cutlery knives are those of etching any metal which depend upon applying a coating of some resistive material to the blade of the knife, then piercing the resistive material with a stamp of the desired etch moistened with caustic to expose the metal which is to be acted upon by an acid solution.

The procedure of etching will vary with the grade or quality of the steel knife to be etched. Among carbon steel knives we may have cheap knives, and high grade knives. The cheap grade of knives must be handled in large volume. Therefore the quality of the etch both for clearness and depth may be affected. The high grade carbon knives must have a clear, sharp deep etching. In addition to carbon steel knives we also have stainless steel knives of a very high grade that are etched.

GENERAL PRINCIPLES

Irrespective of the kind or quality of knives to be etched, the following operations are necessary:

1. Washing or cleaning.
2. Applying the resist or varnish.
3. Stamping.
4. Applying acid.
5. Removing resist and drying.

The knives to be etched must first be washed in gasoline to remove any grease or oil, and dried in sawdust. The sawdust must be carefully removed from the knives. Many difficulties may be encountered by failure to wash properly or remove sawdust from the knives. Upon dirty knives, the resist adheres improperly, resulting in acid marks, while the sawdust contaminates the varnish to such an extent as to make it unfit for use until the sawdust is removed.

MATERIALS

Varnish: The nature of the varnish to be used is dependent entirely upon the results desired in etching. For high class etching, a resist of a good body is highly essential.

Formula No. 1

1 part Berry Brothers Japan Dryer No. 1.
3 parts High Test Gasoline.
Varnish tests 50° Be'.

Formula No. 2

A varnish having considerably more body than No. 1 and capable of being used much thinner has the following composition:

2 parts Berry Brothers Japan Dryer No. 1.
3 parts High Test Gasoline.
3 parts High Test Gasoline-rosin solution.
Solution tests 54° Be'.

The high test gasoline-rosin is made by dissolving 2 lbs. of powdered rosin in 5 gallons of gasoline. A stock varnish solution of 1 part Japan Dryer and 3½ parts gasoline, of which additions are made to maintain volume. If through evaporation the density falls below 52° Be', gasoline alone is added.

Formula No. 3

The following is an air drying varnish, although a moderate heat may be used to expedite the drying.

Gum Guniac	2 ozs.
Gum Benzoin	2 ozs.
Fusel Oil	8 fl. ozs.
Alcohol	8 fl. ozs.
Rosin	8 ozs.

To dissolve thoroughly, heat in a reflex condenser, and when cool, filter. Gravity 32° Be'. It is not necessary to use any alcohol to thin out this varnish in applying to knives.

STAMPING MACHINE & STAMPS

There are various types of machines that might be used for stamping the etch on knives. The best type, however, is one that has the fewest adjustment screws and is of the vertical type. (See Fig. 1.)

FIG. 1. ETCHING STAMPER

The stamps used to pierce through the varnish are rubber. They should be of a clear sharp cut as considerable of the success of good etching is dependent upon a well-cut stamp. As soon as a stamp begins to show wear it should be discarded, as irregular and incomplete impressions are formed. The life of a stamp will depend to a great extent upon the care taken with it, as caustic left upon a stamp when not in use will ruin it. The caustic used upon stamps to pierce through the varnish has a solvent action upon the rubber. Consequently when stamps are removed from the machine they should be very carefully washed out.

CHEMICALS

The etching process consists, as has already been stated, of removing varnish and exposing the steel. The solvent for the varnish varies, some moistening the pad on the machine with concentrated potassium cyanide solution; or 1 lb. of potassium hydroxide dissolved in 1 pint of water, applied to the pad also makes a good varnish solvent. However an etching paste is found more suitable. An etching oil of the following composition is first made:

Amyl Acetate	1 fl. oz.
Acetone	1 oz.
Denatured Alcohol	12 ozs.
Oil of Mirbane	2 ozs.
Fusel Oil	8 ozs.

With this oil a paste is made up of finely powdered potassium hydroxide and soda ash. This paste is rubbed into the pad. The consistency of the paste will vary with atmospheric conditions. On damp days the paste may be used a little drier, as it will readily absorb moisture from the air, while on dry days the paste may be used a little more moist. After the varnish has been removed and

metal exposed, the etching is done by applying acids to the exposed steel.

For etching carbon steel knives the following may be used:

(1) Nitric Acid—35° Be'.....1 part
Water .....8 parts
(2) Nitric Acid—35° Be'.....1 part
Water .....4 parts

To Etch Stainless Steel:

(1) To 34 fluid ozs. of hydrochloric acid is added 34 fluid ozs. of water. Then add 2 ozs. mercurous nitrate and 16 ozs. of powdered glue. Heat until in a solution. Allow to cool before using.

(2) Hydrochloric Acid .....3 parts
Nitric Acid .....1 part

This is a stock solution of which, when actually using, 3 parts are taken to 1 part water.

Etching Cheap Cutlery Carbon Steel Knives:

VARNISH FORMULA NO. 1 OR NO. 2

(MECHANICAL OPERATIONS)

The cleaned knives are racked and dipped into the varnish solution contained in a sheet steel tank. The density of the varnish is maintained more or less to the standard depending upon atmospheric conditions and other operating conditions, affecting the quality of the etch. After the knives are dipped they are suspended, so that the excess varnish will drip back into the tank. When the varnish has set so that it has a sticky or tacky feel, the knives are stamped with a rubber stamp moistened from

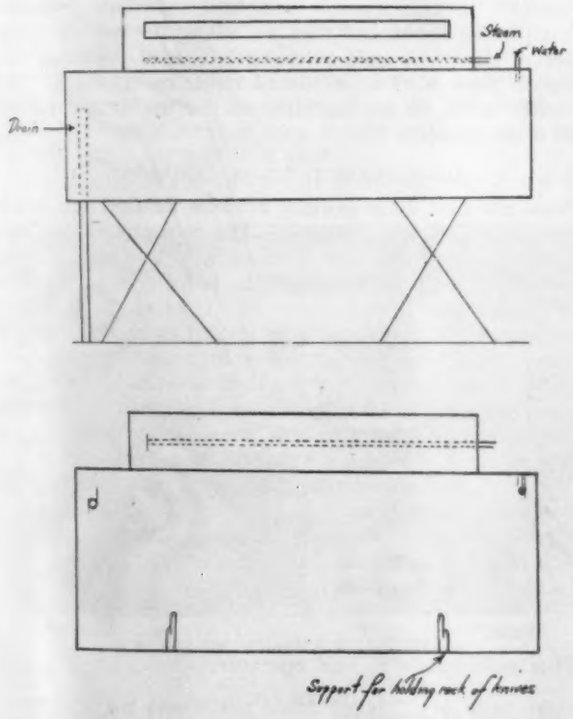


FIG. 2. KNIFE RACK

a pad containing the resist solvent, which reveals the portions of the steel to be acted upon by the acid.

When the varnish has thoroughly dried, the racks of knives are taken to the acid pouring tank. (Fig. 2). The potash on the stamped portion of the blade, in the meantime has dried. To dissolve this and to complete the removal of the varnish from the steel, the rack of knives is momentarily placed in a steam chamber. The rack is then placed upon holders upon the tank and the etch is washed out with clean water and a soft camel's hair brush. A glue solution is now applied to the stamped portion to prevent the acid from collecting in globules and to confine it to the section of the etch. The acid is then poured from a lipped container over the section to be etched, and allowed to remain until the desired depth of etching is obtained. The acid is washed off by dipping the rack of knives in running water. To remove the varnish, the knives are dipped in hot caustic solution, rinsed in water and washed in gasoline to remove the last traces of varnish and water. The knives are then dried in hot sawdust.

ETCHING HIGH GRADE CARBON KNIVES AND STAINLESS STEEL

The same procedure regarding cleanliness and racking are followed as described for the cheaper grade of knives. The varnish used, however, is formula No. 3 and is applied with a soft camel's hair brush, first on the side that is to be stamped, and after the stamping, the other side is varnished. After the varnish has thoroughly dried, the operations of etching follow those already described. In the case of carbon knives, nitric acid 1 part to 4 parts of water are used to etch the knives. In the case of Stainless Steel, acid formula No. 1 or No. 2 are used; No. 1 is best applied with a brush, while No. 2 can be poured. After the etching is sufficiently deep, the varnish is removed as already described.

USUAL DIFFICULTIES IN ETCHING

1. Much difficulty may be experienced by the formation of acid marks on the blades. These may be caused by:

(a) Dirty or greasy knives causing poor adhesion of varnish.
(b) Dirty or grainy varnish.
(c) Varnish too thin.
(d) Varnish not dry enough.
(e) Careless stamping, causing a spattering of caustic in stamped section.
(f) Acid too strong.

2. Be' readings on varnish are not infallible tests as to correct density to use. Practical tests are much more conclusive.

3. The drying of the varnish is dependent upon atmospheric conditions. Wet days cause varnish to dry milky; cold days slowly; hot days quickly. Therefore judgment must be used in method to be used to dry the varnish. A small electric fan aids the varnish to dry when its tendency to do so is slow.

4. **Stamping.** The adjustment of the stamp in the machine is important, as upon the adjustment will depend the clearness and sharpness of the etch. Stamps should be clear and clean. When a stamp is put away it should be washed out. When a stamp is being used over a period of several hours it should be occasionally removed from the machine and washed out. For proper etching the varnish should not be too dry, but just tacky.

The adjustment and condition of the pad is also important. The pad should be hard and smooth, so that when the stamp is brought down on it, the stamp will pick up an even amount of caustic. The pad should be kept merely moist with caustic, not wet.

Jewelry and Novelty Finishes

The Process of Coloring 10k and 14k Gold Jewelry. Also Cheap Brass Novelty Work and Jewelry Novelties

Written for The Metal Industry by E. L. TANNERT, Plater

The articles as they come from the jewelers' bench to be finished up presentably are generally coated with a green film or scale which comes from the process of soldering and annealing in the course of manufacture. This green scale is sometimes removed by a stripping process, when articles require a highly polished finish, and left on when the finish called for is rose gold, Roman gold or any of the combination antique finishes.

BRIGHT GOLD OR ENGLISH FINISH

Bright gold or English finish work is strung up on copper wire of a suitable gage. It is then put in a solution of lye or potash cleaner to remove all grease. Next it is rinsed off well and placed into a pickling acid consisting of 4 parts water and 2 parts sulphuric acid. When making this pickling acid, always add the acid to the water, adding acid very slowly.

Leave work in this pickle for a period of about 15 minutes, then take out and rinse off well in clean water. Next pass through a stripping solution, consisting of 6 ozs. of yellow prussiate of potassium; 3 ozs. of cyanide of potassium; ½ oz. of liquid phosphoric acid; 1 gallon of water. For this solution use from 6 to 9 volts with a reverse current, using a lead anode. Liquid phosphoric acid may be added in small quantities to this solution when it does not strip work bright enough, say about 10 drops at a time. The work should be given full current at first, for say 2 seconds, and quickly agitated thereafter until desired brightness appears on work. The work is then dried out in clean boxwood sawdust, and is ready for the polishing bench or room.

When polished, it is given a flash through a 24 karat gold solution, consisting of gold chloride 5 cwt. fine gold; cyanide of potassium 3 ozs.; bisulphite of soda 1/6 oz.; water 1 gallon. Fine gold anode to suit operator; 6 to 9 volts. This operation requires a good deal of care and experience on the part of the operator, for carelessness will mean that work will acquire a clouded effect and will have to be re-polished. The work is generally given full current for about 1 second, agitated for about 5 seconds more, quickly rinsed in perfectly clean water, then rinsed again in perfectly clean hot water and dried out in perfectly clean boxwood sawdust.

I may add that this same process of getting an English finish can be followed, not only on high class goods but on all cheap brass jewelry requiring a polished English gold effect where immersion or dip gold solutions are not used. If a red or 14 K. shade is desired, to make a separate gold solution, same as given for yellow and add 1½ dwt. of copper chloride to each gallon of solution. The copper chloride should be thoroughly taken up with cyanide of potassium before adding to fine gold solution. In taking up copper chloride, add a little water, say 1 pint, and stir well, and in another pint of water (hot) add 1 oz. of cyanide. When this is dissolved, mix both together and add to fine gold solution. Mix in order named.

BRIGHT GREEN GOLD FINISH

For a bright green gold finish, use the same process as given for red gold. Make a separate yellow gold solution and add 1½ dwt. of chloride of silver. Mix this silver the same way the copper is mixed in the red gold. This is, of course, for a light green solution. Dark green solution is darkened with a smut which I will give later on.

Of course, it must be understood that on cheap brass jewelry, the preliminary pickling is practically the same as in good jewelry. The only difference is that instead of stripping brass jewelry by electric current, you burn it off with what is called a burning off dip, consisting of nitric acid 3 quarts, water 1 quart, and about ¼ lb. of common salt added to dip. The work is left in this dip for about 1 minute, after which it is taken out and rinsed in clean cold water and again passed through a bright acid dip, composed of 2 quarts of nitric acid, 3 quarts of sulphuric acid and about 4 ozs. of common table salt, added to the dip. The dip should be mixed in order given and allowed to cool off thoroughly. When cool, add your table salt, stir and let dip cool off again before using.

CHEAP NOVELTY FINISHES

Now for the cheap novelty work finishes, such as rose gold, dark green, light green and other antique finishes. The bright finishes remain bright and are lacquered in a clear transparent white lacquer, each bright finish in its individual color. They are then taken and filled in with any desired chrome or pigment, such as may be in demand. These can be got from any of the leading lacquer concerns. In this manner you have only one operation in the plating room, and that is flashing the work through different shades of gold solutions. This at the same time gives all your work a burnished effect on the high lights or relief work, to say nothing of the uniform color acquired on quantity lots.

HIGH GRADE JEWELRY FINISHES

Now the first class jewelry antique finishes are got in an entirely different manner. The work is taken from the jewelers in the green state as mentioned before, and polished where it is necessary to polish, and then it is sand-blasted for a dull matte effect which helps to get background for a rose gold or similar antique finish. It is then run through a cleaning solution and rinsed thoroughly in clean water. It is then scratch-brushed with a brass wire brush and again rinsed in clean, cold water. Now it is ready for the bath or coloring solution, for whatever color it is desired to put on it.

For rose gold solution for this kind of work, I would recommend the following:

ROSE GOLD

Cyanide of potassium	6 ozs.
Fine chloride of gold	5 dwt.
Potassium carbonate	1 oz.
Water	1 gallon

Fine gold anode to suit operator.

GREEN GOLD

Cyanide of potassium	6 ozs.
Chloride of gold	5 dwt.
Potassium carbonate	1 oz.
Silver chloride in cyanide form	1½ dwt.

Green gold anode to suit operator.

This is a light green gold. To darken this solution, use either arsenic or lead, whichever operator prefers; lead carbonate or white arsenic taken up with caustic

potash. This must be done in a very careful manner, for an overdose of either one will entirely ruin your solution. I would advise operator to use a common ordinary eye dropper in adding darkener or smut, as some platers term it. In this manner there is little chance of spoiling or getting an overdose in your solution. To make up these solutions put in a bottle with say a pint of water and add enough caustic potash gradually until it picks up all your lead or arsenic. Stir well and let stand. Use only the top and clear liquid of this mixture to darken up.

As for using these solutions and getting required results, you use full voltage on your work at first to strike it and then keep on agitating your work until desired color or shade is obtained. Same rule is laid down for both solutions, rose gold and green gold. If so desired, you may strike on full current and reduce down to 2½ volts leaving work in bath to take on a slow soft smut. Now when desired color is obtained, remove work from solution; rinse off well in clean cold water and relieve with bicarbonate of soda by rubbing briskly over high lights with soda. Then scratch brush with brass wire brush and soap bark wherever it may be desired to give the contrast. Rinse again in clean cold water and again in clean hot water and dry out in thoroughly clean boxwood sawdust.

These formulae were successfully used by a number of firms in New York. There are several other ways of obtaining the same results, but they are a little more expensive, requiring more time and material and come more under the heading of a middle class of finishes, with a first-class appearance.

It may seem to some that the formulae for gold solutions, green and yellow, are entirely too high in cyanide content, but this content of cyanide is based on doing work in large quantities. Naturally there must be a conducting salt and that is the reason for the excess of cyanide. I have been able to do as many as 2 dozen 8-inch bag frames in a 10 gallon jar in a period of about ½ minute, striking the frames with full current at first and agitating quickly until desired color was obtained.

In the English finish gold formula a little more cyanide than the average is called for. The reason is the same. Where quantity and production are wanted the plater will fare much better with a fast working solution.

Every practical plater will understand this, but those who are not so experienced should be careful to regulate their cyanide content to suit the amount of work, say using from 1 oz. to 6 ozs., (but never below 1 oz.), for 5 dwt. of gold per gallon.

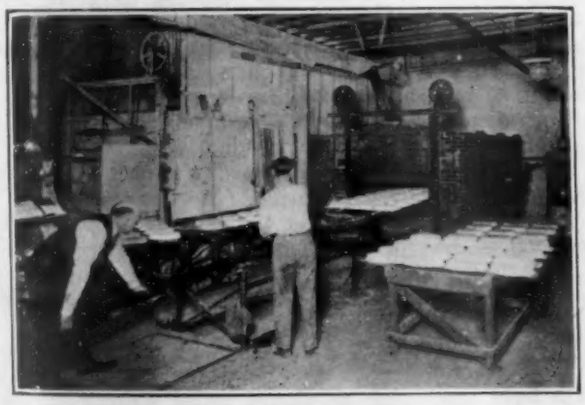
Another advantage in using an excess of free cyanide is that it drives a smut on the work along with the carbonate of potash, in half the time taken by a slow working solution.

Vitreous Enameling

By C. L. IPSEN, General Electric Company*

In applying the vitreous enameled coating familiar to lighting reflectors, kitchen ware, and sanitary ware, it is necessary to heat the metal to a high temperature to fuse the coating and render it adherent to the metal. The coating, consisting essentially of pulverized glass, is applied to the metal either as a thin paste or liquid, by dipping, or, as a powder, by dusting it on the hot metal. The former, or wet process, is used chiefly on sheet metal parts and the latter for cast iron parts.

The illustration shows a typical installation of the furnace used for enameling sheet metal. The chief requirements of the enameling furnace are: (1) High rate of production since the labor of charging the furnace constitutes a large part of the enameling expense. (2) Pure furnace atmosphere to prevent contamination of the enamel. (3) Uniform heating to the correct temperature to maintain a high quality product. (4) Low maintenance cost, and (5) a minimum of interruptions in production.



ELECTRIC ENAMELING FURNACE

The electric furnace ideally fulfills all these requirements. At average rates for electricity it suffers the disadvantage of a somewhat higher cost for heat. The large number of furnaces in operation have demonstrated conclusively, however, that in most cases other advantages of the electric furnace readily outweigh its higher heat cost and give a product of better quality at a lower "over-all" cost.

*Abstracted from a paper read at the Convention of the American Institute of Electrical Engineers, St. Louis, Mo., April 15, 1925.

Muriatic and Sulphuric Pickles in Galvanizing.

By Dr. Ing. Heinz Bablik*

The summary of the experiments given by the author show that:—(1) With the sulphuric pickle the action is largely mechanical (i.e., the scale is burst off by the hydrogen pressure) as well as chemical, but is almost wholly chemical with muriatic pickle; (2) that the muriatic pickle, however, attacks less the basis than does sulphuric pickle; (3) that the acid consumption is less with sulphuric than with muriatic pickle, but that the rate of pickling is greater in the second than in the first case; (4) that the rate of pickling is less the higher the concentration in the case of muriatic pickle, but that the minimum rate is given at a 25 per cent. concentration with sulphuric acid; (5) that the rate of pickling with both pickles is greatly increased the higher the temperature of the pickle, and that owing to the length of time for pickling with sulphuric acid at normal temperatures, it is only practicable to use a sulphuric pickle warm; (6) that the greater the accumulation of the reaction products of pickling in the pickling vat, the lower the rate of pickling, and the more those products adhere to the material pickled on withdrawing from the vat, thus requiring greater further cleaning before transference to the galvanizing bath.

* Abstracted from an article in Stahl und Eisen.

A Method of Improving the Properties of Aluminium Alloy Castings

Some Experiments on Methods of Improving the Properties of Aluminium Alloy Castings. This Work is Part of the Programme of Research on Light Alloys Being Carried Out at the National Physical Laboratory for the Engineering Research Board of the Department of Scientific and Industrial Research. Read at the Meeting of the British Institute of Metals, March 11, 1925.

By S. L. ARCHBUTT,

(From the National Physical Laboratory) Teddington, England

Aluminium alloys cast in sand are in general inferior in mechanical properties and general soundness to corresponding castings made in metal or chill moulds. The slower rate of solidification which occurs in a sand-mould produces a coarse grain which is in itself detrimental to mechanical properties. These effects are, however, usually accentuated by general unsoundness, commonly of the type known as "pin-holing."

The "pin-holes" are small cavities more or less spherical in shape, fairly uniformly disseminated through the body of the casting; they are revealed on machining, as shown in Fig. 1.

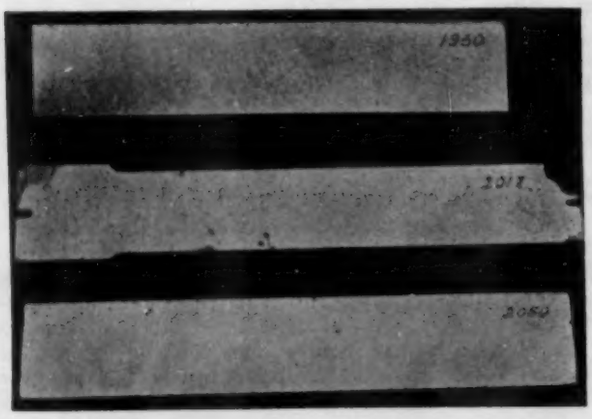


FIG. 1. LONGITUDINAL AXIAL SECTIONS OF 1-INCH DIAM. SAND-CAST BARS "Y"-ALLOY, MACHINE FINISH

Coarseness of grain and pin-holing are accentuated in sand-castings by high pouring temperatures. If melting and pouring temperatures are kept low, considerable improvement can be effected in respect of these defects.

Under the most carefully controlled conditions, however, employing normal foundry practice and treatment of melts, it has not been found possible at the Laboratory to effect more than a certain degree of improvement in soundness.

Using the 1 in. diam. bar as a standard form of casting, cold dry sand moulds, melting temperatures not exceeding 730°C., pouring temperature as low at 650° C., and ample risers and runners, the general order of density cast bars of aluminum alloy "Y"† (with the skin on) is 2.735, with an occasional value as high as 2.750. These values are to be compared with 2.780 for corresponding bars cast in metal moulds.

The average tensile properties of these two classes of bar in the cast condition are as follows:

	Sand Cast	Metal Cast
Density with skin on	2.735	2.798
Yield stress, tons per sq. in.	....	11.4
Ultimate stress, tons per sq. in.	10.5	14.8
Elongation, per cent. on 2 in.	0.5	2.5

The fact that pin-holing can be eliminated in castings of normal thickness by employing metal moulds is well known at the National Physical Laboratory and probably in most aluminium foundries.

It is the case, for example, with 1 in. diam. bars of "Y" alloy and other aluminium alloys. The fact has also been observed at the Laboratory that very slow solidification, such as occurs when a melt is allowed to solidify in the pot in the furnace, also inhibits pin-holing.

In the case of a sand-cast piston in "3L11" alloy sent to the Laboratory for examination, which exhibited profuse pin-holing on machined surfaces, a portion was remelted and caused to solidify slowly in a small crucible. A polished section of this ingot was practically free from pin-holing and gave a density of 2.812 compared with 2.769 for material from the piston. It is evident, therefore, that both rapid and very slow solidification inhibit "pin-holing," and that some intermediate rate such as occurs in a sand mould, is most favorable for its formation. These facts together with others led to the conviction that the cause of "pin-holing" is occluded gas, and particularly that portion of gas which is liberated during the act of solidification.

It appears that if solidification was sufficiently rapid, as in a metal mould, the occluded gases in the melt were not liberated, but retained in solution in the solidified alloy. If solidification was sufficiently slow the gas was liberated and enabled to free itself from the solidifying melt, while at intermediate gates it was liberated from solution but entrapped in the form of minute bubbles causing pin-holing. It appeared probable, therefore, that if a melt were slowly solidified it would largely rid itself of occluded gas, and that castings poured from the remelt would exhibit improved soundness, providing that not much fresh gas was absorbed during remelting.

Experiments on these lines were immediately successful (G3 of Summary Table, Appendix).

The treatment consisted in allowing a melt to solidify slowly in the uncovered crucible (Morgan Salamander) in the furnace. As soon as it was solid and without further cooling, the crucible was covered, the furnace relighted, and the metal remelted, raised to the required temperature, and castings poured. From melts of 10-20 lb. of "Y" alloy treated in this way, 1 in. diam. bars cast in sand were obtained giving, without any machining, density of 2.78 and higher.

On light machining an almost entire absence of pin-holing was observed, the surface appearance closely resembling that of a chill-cast bar. Bars from these melts gave very uniform ultimate stress, varying from 11.3 to 11.8 tons per sq. in. (as cast), representing an increase in strength of the order of 10 per cent over that of sand-cast bars from untreated melts described above (G1 of Summary Table, Appendix).

The improved soundness obtained by the treatment above described is illustrated by bar sections 2030 and 2046 in Fig. 2.

Occasionally during the above treatment small explo-

† Copper 4, nickel 2, magnesium 1.5 per cent, aluminium remainder.

sions occurred at the surface of the melt, suggesting that inflammable gas was being ejected and igniting.

Preliminary ingotting of aluminium alloy melts may therefore be decidedly advantageous provided that the rate of solidification of the ingots is slow enough, but

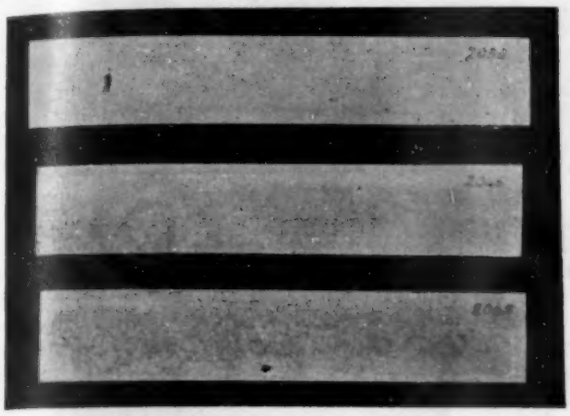


FIG. 2. LONGITUDINAL AXIAL SECTIONS OF 1-INCH DIAM. SAND-CAST BARS "Y"-ALLOY. MACHINE FINISH. TREATED MELT

marked improvement is not to be expected from ordinary ingotting in metal moulds. The results obtained from a 20-lb. melt of "Y" alloy ingotted in chill moulds remelted and poured (G2 of Summary Table) confirm this. Four 1 in. diam, sand-cast bars from this melt gave (with the skin on) an average density of 2.744 and ultimate stress of 11.29 tons per sq. in., representing a slight improvement only on results from normally treated melts uningotted (G1 of Summary Table).

Further experiments have been made with "Y" alloy, in which treatment of melts on the lines indicated above have been modified as follows:

1. The slowly solidified and remelted alloy was ingotted in chill and then remelted (G5 of Summary Table)). A 12-lb. melt was treated in this way, and four 1 in. diam. bars cast in sand. Two of these were tested with the following excellent average results:

Density unmachined	2.774
Ultimate stress, tons per sq. in.	12.20
Elongation, per cent. on 2 in.	1.0

2. Slow solidification and remelting was repeated three times on a melt before pouring castings (G6 of Summary Table). Unsatisfactory results were obtained from a 10-lb. melt treated in this way.

3. Slow solidification was applied to hardener alloys only (G 7, 8, 9 of Summary Table). Some excellent results were obtained from melts treated in this manner.

In the majority of the experiments described above, stirring or other disturbance of the melt liable to introduce gas was purposely avoided after remelting subsequent to slow solidification.

Subsequent experiments showed, however, that careful stirring after slow solidification may be employed without detrimental effects.

Details of the preparation of melts, casting and moulding conditions, and tests on castings relating to the above-described experiments are given in the Appendix.

In all the melts described above, notched-bar aluminium of high purity was employed, giving the following analytical results:

	Aluminium "T" per cent.
Iron	0.16
Silicon	0.16
Copper	trace
Aluminium (difference)	99.68

This metal was tough and ductile under the hammer, and the bars required many reversed bending blows to fracture them at the notches.

In the course of the experiments with this metal, a consignment of aluminium also in the form of notched-bar was received at the Laboratory. This metal was labelled "Made in Norway," and gave the following results on analysis:

	Aluminium "U" per cent.
Iron	0.21
Silicon	0.29
Copper	trace
Aluminium (difference)	99.50

Aluminium "U" is seen to be of high purity but not equal to aluminium "T" above mentioned.

Under the hammer this metal behaved totally differently from "T" metal, breaking quite short in a brittle manner.

Employment of aluminium "U" immediately upset the regular and consistent character of results, as will be seen from Table I.

It will be seen that on a first application of the slow solidification treatment very inferior results were obtained from two melts of 12 and 20 lb. respectively; also from a 20-lb. melt, YV2017, in which the copper hardener only had been treated before use, a method which when using "T" aluminium had given good results.

On remelting YV2017 and again applying the slow solidification treatment, however, excellent density and soundness were obtained from bars poured at 650° C.

TABLE 1
"Y" ALLOY MELTS WITH "U" ALUMINIUM. SAND-CAST BARS 1 IN. DIAM.

Melt No.	Weight, Lb.	Conditions.	Average Density of Bars. Unmachined	Appearance on Machining.
YV2015	12	Slowly solidified and remelted	2.741	Marked unsoundness and pin-holing
YV2018	20	Slowly solidified and remelted	2.729	Serious unsoundness and pin-holing
YV2017	20	Copper hardener only slowly solidified	2.718	Serious unsoundness and pin-holing
YV2024	12	Ordinarily melted	2.752	Marked pin-holing
YV2030	20	Ingot and scrap from YV2017 remelted and slowly solidified	2.775*	Slight pin-holing

It would appear, therefore, from these results that with certain grades of metal more than one application of the treatment in question may be necessary.

In this particular instance the aluminium was suspected of containing an unusual amount of occluded gas. In order to obtain evidence in the matter some melts of this

TABLE 2
EXPERIMENTS ON THE TREATMENT OF "U" ALUMINIUM. SAND-CAST BARS 1 IN. DIAM.

Mark.		Treatment	Density Unmachined.	Appearance after Machining.
"Made in Norway"		Section from notched-bar	2.701	....
			2.694	....
V2020	(1)	Ordinary melting	2.639	General unsoundness causing poor machine finish
	(2)		2.641	
V2021	(1)	Slow solidification treatment	2.694	Greatly improved soundness and machine finish
	(2)		2.695	
V2022	(1)	Treatment repeated on ingots and runners, &c., from V2021	2.673	Somewhat inferior to V2021
	(2)		2.676	
V2023	(1)	Treatment repeated on ingots and runners from V2022	2.671	Markedly inferior to V2021
	(2)		2.667	

* A longitudinal section through the axis of one of these bars, finished with a fine milling cut, appeared perfectly sound and free from pin-holing. Bar section 2030, Fig. 2 (Plate I.).

metal alone were made and 1 in. diam. bars cast in sand under conditions similar to those employed with the melts already described. The density of the bars unmachined was determined, and they were then lightly machined and examined for appearance.

Particulars and results of these melts are given in Table II.

The results show that (1), ordinarily melted and cast, this particular aluminium gives sand-cast bars of abnormally low density.

(2) On remelting and applying slow solidification treatment normal density is obtained, accompanied by great improvements in the appearance of machined surfaces.

(3) Repeating the slow solidification treatment is detrimental.

(4) The density of the notched-bar as supplied is normal and illustrates the fact previously pointed out, that by rapid solidification occluded gas is retained in solid solution and has little if any effect on density.

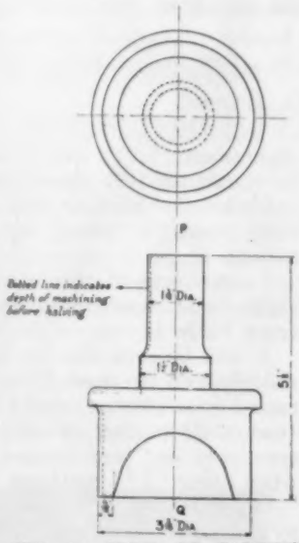


FIG. 3. TYPE OF CASTING USED FOR EXPERIMENT

OTHER EXPERIMENTS

Some experiments have been made with a form of casting shown in section in Fig. 3.

This form was chosen as being readily machined all over in a lathe and presenting considerable variation in thickness of section, which was in parts a good deal heavier than a 1 in. diam. bar.

The castings were poured bowl uppermost, in dry-sand moulds. The casting weighed approximately 1½ lb. The following results were obtained with "Y" alloy:

TABLE 3

Melt No.	Treatment of Melt	Lightly Machined.	Appearance after Machining.
YV1971A	Ordinary	2.702	Marked "pin-holing"
YV1971B	Slow solidification applied to remelt of YV1971A	2.763	Sound—no "pin-holing"
YV1972	Slow solidification applied to remelt of YV1971B	2.749	Slightly inferior to YV1971B

Castings from melts YV1971A and B were halved on the axis PQ, Fig. 3. The pin-holing exhibited on the external machined surface of A was seen to extend completely through the body of the casting, whereas B appeared equally sound throughout. Photographs of these two sections are shown in Fig. 4.

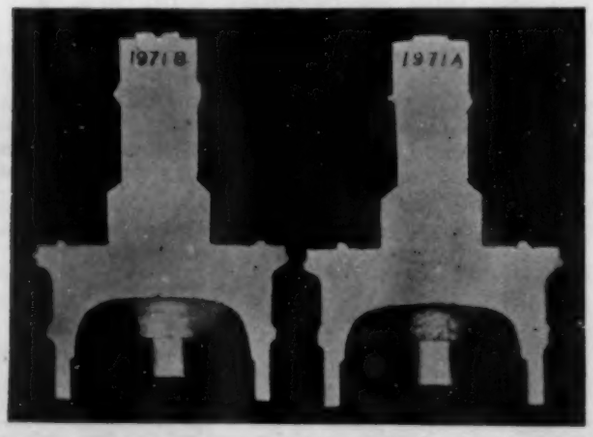


FIG. 4. AXIAL SECTION OF SPECIAL CASTING, MACHINE FINISH. 1971A, ORDINARY MELT; 1971B, TREATED MELT

The difference in appearance of machined surfaces of these two castings is very striking.

In consideration and discussion of the above results, it was suggested to the author by Dr. Rosenhain that removal of small bubbles of gas liberated and entangled in molten metal or alloy might be facilitated by passing through the melt an inert gas such as nitrogen. The following experiment was therefore made.

A melt of 12 lb. of "Y" alloy was made up in the manner described in the paper, employing "U" aluminium. The crucible lid was removed and the melt allowed to cool in the furnace. Commencing at 710° C., a stream of nitrogen of ordinary commercial purity from a high-pressure cylinder was passed through the melt by means of an iron tube, coated with a wash of alundum, extending to the bottom of the crucible. The passage of nitrogen was sufficiently rapid to produce the effect of moderate ebullition of the melt, without ejection of liquid from the crucible. From the commencement of passage of the nitrogen a gas which took fire and burnt with a blue flame was observed to be escaping from the surface of the melt, together with the nitrogen. The melt took approximately twenty minutes to cool from 710° C. to 650° C., and it was during the first ten minutes or so of this cooling that the inflammable gas was evolved in sufficient quantity to take fire.

The melt was held at 650° C. for fifteen minutes and then allowed to solidify and cool to 500° C. Nitrogen was passed continuously until the melt appeared solid.

The crucible was now covered, the contents remelted, and two 1 in. diam. bars poured at 650° C. in sand. These two bars, unmachined, gave the following density values:

Melt No.	Density.
YV2048 (1)	2.795
YV2048 (2)	2.794

On machining, these bars were found to be remarkably sound and free from pin-holing. A longitudinal section through the axis of test-bar 2048 (2) above, finished with a fine milling cut, is shown in Fig. 2, and illustrates the excellent soundness of these bars.

The densities recorded indicate a further marked improvement in soundness over and above the best previously obtained by slow solidification treatment alone. The values are almost equal to the best so far obtained from chill-cast bars from ordinarily treated melts.

SUMMARY

The experiments here described and the results obtained from them are to be regarded as indicating the possibilities of a method of treating aluminium and certain of its alloys, which serves to eliminate at all events a considerable proportion of dissolved gas and thus reduces unsoundness, and to a considerable extent removes pin-holing. The process suggested consists in allowing the molten alloy or metal to cool slowly in the crucible in the furnace until it has just completely solidified; it is then remelted, and may be carefully stirred, raised to the pouring temperature, and cast. Ingotting the metal is not satisfactory, as the ingots cool too quickly, and during remelting are too much exposed to the furnace gases.

In a later experiment described, passage of an inert gas through the melt during slow cooling and solidification has been found to improve still further the soundness of resulting sand-cast bars.

Slightly anomalous results have been obtained in some

cases, and it is not yet clear how far the method is of value in other alloys, whether consisting mainly of aluminium or of other metals. It is evident that much further investigation is required. Meanwhile, the author has learnt, and is authorized to refer to the fact here, that simultaneously and independently Professor C. A. Edwards and Mr. W. E. Prytherch of Swansea, working on the effect of gases in copper (for the British Non-Ferrous Metals Research Association) have discovered a similar effect obtained by solidification in the crucible in the case of pure copper.

APPENDIX

A. Metals and Hardeners

Metals of high purity were used.

Analyses.—Aluminum—Notched bar—analyses are given earlier in this page.

Copper—Electrolytic cathode plates.

Nickel—Shot, Mond Nickel Co., 99.9 per cent. nickel.

Magnesium—Chill rods. Chemical analysis:

	Per cent.
Silicon	0.01
Iron	0.08
Copper	0.02
Magnesium (difference)	99.89
	100.00

The copper and nickel were added to the aluminium in the form of "hardener" alloys of aluminium containing 45.7 per cent. copper and 20 per cent. nickel, respectively.

B. Preparation of "Hardener" Alloys

(1) Copper-aluminium (45.7 per cent. copper).
(2) Nickel-aluminium (20 per cent. nickel).

1. The copper is first melted under charcoal and the aluminium added gradually. When the whole of the charge is molten the alloy is thoroughly stirred, skimmed, allowed to cool to 700° C., and poured into notched slabs in chill moulds. It is readily broken up for weighing-out charges.

2. The nickel hardener is rather more difficult to make. The aluminium is melted and the temperature raised to, and retained at 900° C. until the whole of the nickel is dissolved.

The nickel is added in small quantities at a time in the form of shot. Each charge of nickel must be completely dissolved and the melt stirred before a further addition is made, otherwise a compact difficultly soluble mass may be formed at the bottom of the crucible which requires a considerably higher temperature and a much longer period to dissolve. The alloy has a considerable temperature range of solidification and is poured into thin notched slab ingots in chill moulds, in order to prevent serious differences of composition arising during solidification.

The alloy is cooled to 850° C. before ingotting. It is readily broken up for weighing-out charges.

C. Melting—Ordinary Method of Preparing Melts

A 100-lb. "Richmond" gas-fired draught furnace is employed, town gas being used. The metal is melted in a Salamander crucible closed with a lid, the crucible being

SUMMARY TABLE—SUMMARY OF "Y" ALLOY SAND-CASTING EXPERIMENTS (1 IN. DIAM. BARS), ALUMINIUM "T"

Conditions of molding as in Fig. 5. Molds, dry and cold. Pouring rate, medium.

General Conditions	Heat No.	Maximum Metal Temperature, °C.	Conditions of Melting	Bar No.	Pouring Temperature, °C.	Analysis. Per Cent Fe.	Si.	Mg.	Ni.	Cu.	Density. Grms. per c.c.†† Bar 1 in. × 6 in	Bar ⅞ in. × 6	Test-Piece	Tensile Tests. "As Cast" Ultimate Stress Tons Per Sq. In.	Elongation, Per Cent on 2 In.	Appearance of Surface After Fine Machine Finish to ⅞ In. Diam.
											Unmachined					
G1	YV1930 (25 lb.)	730	Ordinary method as generally used.	A1	700	...	...	...	...	...	2.738	2.759	2.737	10.85	0.5	Very marked general "pin-holing."
				A2	700	...	...	...	...	...	2.733	2.746	2.737	....	..	
				B1	650	...	...	...	...	...	2.720	....	....	....	..	
				B2	650	...	...	...	...	...	2.725	....	2.734	10.40	nil	
	YV1931 (20 lb.)	720		A1	650	...	...	...	...	...	2.743	....	....	....	..	
				A2	650	...	...	...	...	...	2.734	....	2.740	10.10	0.5	
				B1	700	...	...	...	...	...	2.735	2.747	2.731	10.90	0.5	
				B2	700	...	...	...	...	...	2.733	2.741	2.740	....	..	
G2	YV1933 (20 lb.)	700	Ingotted once, remelted and poured.	A1	700	...	...	...	...	...	2.741	2.755	....	....	..	Improved, less marked "pin-holing."
				A2	700	...	...	...	...	...	2.747	2.754	2.753	11.26	nil	
				B1	650	...	...	...	...	...	2.744	2.753	2.750	11.31	nil	
				B2	650	...	...	...	...	...	2.745	2.753	2.754	11.31	nil	
G3	YV1936 (20 lb.)	730	Slowly solidified* in crucible and remelted without stirring.	A1	700	†...	...	1.52	1.95	3.92	2.770	....	....	....	..	Very much improved "pin-holing" almost eliminated.
				A2	700	‡0.25	0.21	1.62	2.17	4.35	2.766	2.767	....	....	..	
				B1	650	...	...	...	...	...	2.780	2.780	....	11.56	1.0	
				B2	650	...	...	...	...	...	2.777	....	....	....	..	
	YV1937 (20 lb.)	730		A1	650	†...	0.19	1.45	2.01	4.00	2.772	....	....	....	..	
				A2	650	‡...	0.19	1.46	2.06	4.08	2.769	....	....	....	..	
				A3	650	...	...	...	...	...	2.775	....	....	11.55	1.0	
				A4	650	...	...	...	...	...	2.785	....	....	....	..	
	YV1974 (2 lb.)	750		1	650	...	...	...	...	...	2.755	....	....	....	..	
				2	650	...	...	...	...	...	2.753	....	....	....	..	
				3	650	...	...	...	...	...	2.754	2.761	2.760	11.84	1.5	
				4	650	...	...	...	...	...	2.760	2.768	2.770	11.32	0.5	
	YV1979 (10 lb.)	750		1	650	†0.12	0.15	1.55	1.74	3.52	2.770	2.778	2.777	11.44	1.0	
				2	650	‡0.17	...	1.73	2.11	4.20	2.775	2.780	2.780	11.60	1.0	
G4	YV1943 (10 lb.)	720	Slowly solidified in crucible and remelted with stirring.	1	650	...	...	...	...	...	2.763	....	2.773	11.64	1.0	Very similar to previous batch, traces only of "pin-holing."
				2	650	...	...	...	...	...	2.762	....	2.772	11.89	1.0	
G5	YV1988 (12 lb.)	750	Slowly solidified in crucible, remelted and poured into chill ingots, remelted and poured. No stirring.	1	650	...	...	1.45	1.98	3.95	2.777	2.783	2.784	12.33	1.0	Very good indeed. No pin-holes visible.
				2	650	...	...	1.49	2.07	4.25	2.770	2.778	2.780	12.06	1.0	
G6	YV1980 (10 lb.)	770	Repeated slow solidification and remelting three times without stirring.	1	650	†0.15	0.18	1.60	2.07	4.20	2.752	2.765	2.769	9.60	0.5	Some "pin-holing" of a slight order intermediate between G2 and G3.
				2	650	...	...	1.73	2.30	4.54	2.758	2.770	2.772	10.12	1.5	
G7	YV1941 (10 lb.)	730	Slow solidification of copper-aluminium	1	650	0.24	0.18	1.48	2.00	3.93	2.766	2.762	2.765	12.18	1.5	Very good. "Pin-holing" absent.
				2	650	...	...	...	...	...	2.770	2.765	2.767	12.32	1.5	
	YV1989 (12 lb.)	750	hardener only. No stirring of hardener, but final melt stirred.	1	650	†...	...	1.52	1.93	4.16	2.772	2.777	2.779	11.60	1.5	
				2	650	‡...	...	1.56	2.16	4.45	2.768	2.775	2.778	11.32	1.5	
G8	YV1942 (10 lb.)	720	Slow solidification of nickel-aluminium hardener, only; hardener remelted and ingotted.	1	650	...	...	...	...	...	2.758	....	2.767	11.88	1.0	Some general "pin-holing."
				2	650	...	...	...	...	...	2.756	....	2.765	11.60	1.0	
G9	YV1944 (10 lb.)	720	Slow solidification of both hardeners.	1	650	...	...	...	...	...	2.763	2.775	2.769	12.12	1.5	Pin-holes almost eliminated.
				2	650	...	...	...	...	...	2.760	....	2.767	10.80	1.0	

*Period of cooling from maximum metal temperature until solid varied from about 40 minutes with 10-12-lb. melts to 90 minutes with 20-lb. melts. †Test ingot before pouring. ‡Test ingot after pouring. ††Uncorrected. Temperature of water, 15°–17° C.

raised to redness before making the initial charge. The aluminium is melted, raised to 730°-750° C., and the nickel hardener added and dissolved. The copper hardener is then added and dissolved. The melt is carefully skimmed and then stirred. The magnesium is now introduced in a few large pieces by means of a Morgan plunger stirrer. The temperature is adjusted until about 20° C. above the desired pouring temperature, when the pot is removed from the furnace. During cooling the melt is carefully skimmed, and when the temperature required is reached, poured. Carbon rods are used for stirring the metal.

D. Temperatures of Melting and Pouring

Care was exercised in all melting operations to prevent the metal exceeding a maximum temperature of 750° C. Castings were poured at 700° and 650° C. respectively, 650° being ultimately chosen as giving superior results.

E. Moulding

Bars were moulded horizontally in sand, two in a box, and run with a 1 in. diam. down-runner terminating in a skim-gate, as shown in Fig. 5.

Risers were placed at both ends of each bar 8 in. from top of riser to mould joint, and tapering from 2 in. diam. at the top to 1¼ in. diam. at the bottom.

The sand used consisted of a mixture approximating to half new and half old "Mansfield" red sand, which was graded by passing through a ¼-in. mesh riddle.

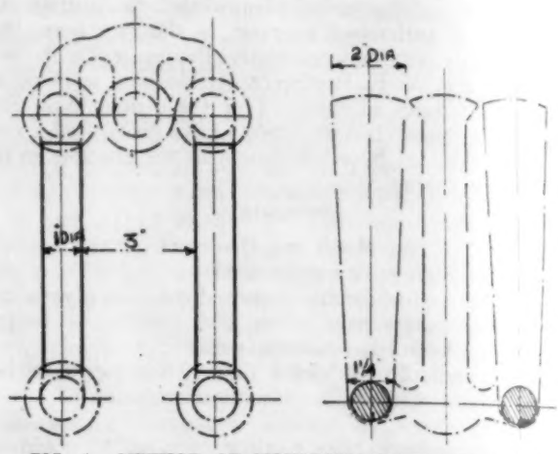


FIG. 5. METHOD OF MOULDING SAND-CAST BARS

Moulds were well dried and allowed to cool before running the bars.

Report on Brass Cutting Tools

As is well known, the action of a cutting tool upon a metal causes the rupture of the material, and, in a ductile material, this can scarcely occur without accompanying plastic deformation. Some time ago a Cutting Tools Research Committee was appointed in Great Britain to investigate the cutting process exhaustively. Dr. W. Rosenhain and Mr. Sturney recently presented the committee's first study in London. The microscopic examination of cross-sections through chips in process of formation, carried out by the committee and described in its report, has afforded a new insight into cutting-tool action.

The material used was, among others, cast brass (copper, 61.38; zinc, 38.50; iron, 0.06 per cent). According to the conditions of cutting, the separated metal takes the form of three distinct types of "chip." First, there is the "tear"type, in which rupture of the metal occurs by the formation, well in advance of the nose of the tool, of a tear or crack tending to run inwards from the pehiphery of the stock, and, since such a tear cannot progress very far, a succession of fresh starts is made by the tool, and the surface of the work is left in the form of rough projections. When the conditions are changed by either reducing the depth of cut or increasing the top-rake angle, or both, the ultimate result is the formation of the third type of chip, which has been called the "flow" type, in the formation of which the principal movement occurs, without actual fracture, in a direction at right angles to a plane of a shear, which is roughly at 30 degrees, with the direction of motion of the tool, and generally forms a continuous spiral or ribbon. This is definitely associated with the smoothest cut surface, and the closest agreement between intended and actual average depth of cut. Under intermediate conditions, the second type of clip is formed, and has been termed the "shear" type, because it is mainly formed by a process of shearing on a plane making, roughly, 30 degrees with the direction of motion of the tool. The material operated upon was 3-inch round bar, turned down so as to leave a number of fins 2.8 inches in diameter and 0.1 inch wide, separated from each other by slots 0.2 inches wide and 0.3 inches deep. The outer surfaces were removed by grinding, before experimental cuts were taken, with ordinary carbon steel parting tools of hardness, by the Shore scleroscope, about 90. No lubricant was used, and a linear speed of about 50 inches per minute was maintained.

It is common knowledge that impurities are occasionally added to materials, such as lead in brass, for the express purpose of making them "free cutting," and the committee's researches clearly explain their effect. Their presence, especially in rolled material, causes a transverse weakness of the material, particularly in shear, while leaving the tensile properties practically unaffected, so that a shear type of chip results under conditions which otherwise would lead to production of the flow type.

The present researches show that the best results in cutting, with regard to the removal of the maximum amount of metal per unit distance of tool travel, the least irregularity of surface, the closest agreement between intended and actual depth of cut, and the minimum wear of tool, are obtained by using a top-rake angle very little smaller than that at which the heavily deformed zone before the nose of the tool just disappears, in conjunction with the greatest depth of cut which still allows the formation of the "flow"type of chip.

The extent to which frictional and abrasive forces developed in the action of cutting are important factors in the complete operation has been investigated at the British National Physical Laboratory by Dr. T. E. Stanton and Mr. Hyde, on behalf of the committee. The cutting actions considered are those due to a perfectly sharp tool before any appreciable blunting action has taken place, in order to study the characteristics of the metal cut rather than the material of the cutting tool. All the present experiments have been made with a simple side-cutting (knife) tool of A. W. steel operating at the end of a hollow cylinder, thus reducing the problem to one of measuring the vertical and horizontal forces of the tool. No cutting lubricant was used in these tests. The dynamometer used was specially designed for the work by Mr. Hyde, and is described in detail in the report. Upward and sideward movement of the end of the pivoted tool-holder is resisted by diaphragms and oil used as a medium between these and Bourdon gauges.

It was found that for each value of the cutting angle,

ranging from 50 degrees to 75 degrees in steps of 5 degrees, the plotted points correlating the horizontal or vertical forces on the tool with the traverse in inches per revolution, lie approximately in straight lines through the origin. The effect of frictional forces on the tool are best studied from graphs in which the components of forces, along and perpendicular to the top-rake surface, are plotted to a base of cutting angles. From these it is seen that (a) the component of the force parallel to the top-rake surface is roughly independent of cutting angle, except for small values of this angle, and (b) the variation in the force normal to the top face falls rapidly at a constant rate as the cutting angle diminishes from 75 degrees. But for all the pieces tested this normal component apparently tends to a limiting value in the lower part of the range of the cutting angle.

The loss of work incurred by the use of large cutting angles is regarded as primarily due to internal friction of the metal in shaving, graphs having been drawn showing the difference between the observed resultant normal and tangential components, and the calculated components of the identing forces.—A. C. B.

Insulating Copper Wire

On Outline of the Methods Used to Apply Protective Coatings.

Written for The Metal Industry by W. J. PETTIS, Rolling Mill Editor.

From the moment the first unit of electric energy was shot through a copper wire the need of a protective covering was recognized in order to make its application, as a carrier of the new energy, safe and efficient, and from this need modern insulation was born and brought to its present high standard.

Insulation can be classed roughly under three heads:

1. Where the insulation acts as a separator of the wires.

2. Where the various waxes are used and must be supported by winding with yarn.

3. The type of insulation on wire used in the wiring of houses for electric light, and other domestic uses, and is so constructed as to stand abrasion, or mechanical action, and allows no change in the position of the wire under the insulation.

It is the last type with which the general public is most familiar, and the methods of applying the different materials that go to make the completed wire are here described.

ELECTRIC LIGHT WIRE INSULATION

A careful dissection of the insulation will show first, a tightly woven fabric, circular in form, without break or seam.

Make a cut through the fabric, running with the wire, and remove the fabric covering. An inspection will show a small section of firmly woven cloth, and a rubber insulation, that lies immediately beneath the cloth and shows the imprint of the fabric on the rubber sheath. This will serve to illustrate how firmly the fabric is woven over the layer of rubber, and why it is possible to manufacture a covered wire that will work as one solid piece when bent or handled and not admit of any independent movement of the component parts.

Next cut through the rubber sheath. On inspection it will be found to be virtually a rubber tube, about three sixteenths of an inch in diameter, with wall approximately one thirty-second of an inch thick, depending on the diameter of the wire covered.

The manufacturing process is so perfect that this rubber cover can be applied to hundreds of feet of wire, without a break or joint of any kind showing. The wire itself will be found coated with tin.

OPERATIONS INVOLVED IN INSULATING

The initial operation in the insulating process consists in tinning the wire. This is accomplished by passing the wire through a bath of molten tin, the wire having been previously treated with a flux, that creates a surface condition which will cause the tin to adhere to the wire.

As it leaves the bath it passes through a wiper, that removes the surplus tin and leaves a bright tinned surface. Pure block tin is used in this process. The purpose of the tin coating is to protect the copper wire against any action of the sulphur contained in the vulcanized rubber covering. This method is not effective on very small wire, and other means are used to prevent injurious action of the sulphur on this class of work.

The next process is the applying of the rubber coating. The rubber is prepared so that it is of uniform texture. It is placed in a machine consisting of a hollow cylinder, one end terminating in a chamber containing a core, and pierced with an opening where a die is held; the die having an internal diameter equal to the outside diameter of the insulation, while the core is bored out to the size of the wire being insulated. The prepared rubber is then forced out by mechanical means between the core and the die, forming a tube closely surrounding the wire, and carrying the wire with it. The process requires great care, maintaining exact temperatures, and many exacting details that are omitted in this brief description.

After the rubber coating is applied the wire is then tested for electrical insulation defects, by passing it through a trough filled with water, and having one side of a high potential circuit attached to the conductor, and the other to the tank.

After passing the test successfully the wire is ready for the fabric covering. This is applied by machines of the general principles of a cloth weaving machine, but so designed as to form the fabric around the wire.

The final treatment consists of the application of one of the various waxes, or asphaltum, to the fabric, followed by a polishing process accomplished by passing the wire through a rotary polishing machine.

The thickness of the insulation is governed by the voltage the wire has to carry. For example, it is estimated that an insulation of rubber three-sixteenths of an inch thick will carry about 15,000 volts, while one-sixteenth of an inch thickness of rubber will carry 1,000 volts.

PROCESS OF INSULATION

There have been few new ideas or new materials used in the process of insulating, dating from its earliest history. It is interesting to note in this connection that in 1860 patents were issued covering "Rubber Coated Wire."

The lead covered cables used in the subways and overhead telephone lines were first laid in the streets of London in 1844, identical in construction with those made at the present time. In 1838 an English patent was issued to a W. T. Cook in which he describes his conductors as "laid within solid lead pipes."

The big advances have been made in the development of machinery for applying the materials whose value as insulators had been developed years ago.

A List of Alloys

Reprinted from the Booklet Published by the American Society for Testing Materials. Part 12*

By WILLIAM CAMPBELL†

GOLD ALLOYS

	GOLD AU	SILVER AG	COPPER CU	OTHER ELEMENTS
Standard Gold, British	91.66	....	8.33	
Standard Gold, U. S.	90.	....	10.	
22 Carat	91.66	4.166	4.166	
22 Carat Dental, Dark	91.57	4.99	3.44	
22 Carat Dental, Light	91.57	8.43	....	
20 Carat	83.33	8.33	8.33	
20 Carat	83.20	10.81	5.99	
18 Carat	75.0	10.4	14.6	
18 Carat	75.00	12.00	13.00	
18 Carat	75.00	14.6	10.4	
18 Carat Dental	74.88	19.13	5.99	
18 Carat Special	75.00	20.00	5.00	
16 Carat	66.6	6.6	26.6	
16 Carat	66.66	11.12	22.22	
16 Carat	66.6	19.4	13.8	
16 Carat	66.45	25.57	7.98	
15 Carat	62.49	11.01	13.25	
14 Carat	58.3	4.16	37.5	
14 Carat Regular	58.33	13.33	28.34	
14 Carat Spring	58.33	16.00	25.67	
14 Carat	58.3	25.	16.6	
14 Carat Special	58.33	27.77	13.90	
14 Carat Dental	58.03	30.03	11.94	
12 Carat	50.00	14.58	35.42	
10 Carat Regular	41.66	12.34	46.00	
10 Carat	41.6	16.6	41.6	
10 Carat Spring	41.66	20.00	38.34	
8 Carat	33.30	20.00	46.70	
Yellow Gold	53.	25.	22.	
Red Gold	75.	....	25.	
Dark Red Gold	50.	....	50.	
Pale Yellow Gold	91.6	8.3	....	
Pale Yellow Gold	91.6	....	....	Fe, 8.3
Green Gold	75.	25.	....	
Green Gold	75.	16.6	....	Cd, 8.3
Green Gold	74.6	11.4	9.7	Cd, 4.3
Green Gold	75.	12.5	....	Cd, 12.5
Grey Gold	85.7	8.6	....	Fe, 5.7
Grey Gold	83.3	....	....	Fe, 16.6
Blue Gold	75.	....	....	Fe, 25.
White Gold	90.	....	....	Pd, 10
Palladium Gold	90.	....	....	Pd, 10
White Gold	75–85	....	....	Ni, 10–8; Zn, 2–9
Gold Solders:				
18 Carat	75.	13.	12.	
18 Carat	62.5	31.25	6.25	
16 Carat	75.	16.6	8.3	
14 Carat	50.	33.3	16.6	
12 Carat	47.8	29.	17.1	Brass, 6.1
10 Carat	41.2	37.	21.2	Brass, 0.6
9 Carat	25.	50.	25.	
8 Carat	40.	36.6	23.4	
Best	62.5	22.5	15.	
Easy Melt	54.5	31.75	13.75	
Very Easy Melt	11.5	54.5	28.5	Zn, 5.5

SILVER ALLOYS

	SILVER AG	COPPER CU	ZINC ZN	TIN SN	OTHER ELEMENTS
Sterling Silver	92.5	7.5	....	....	
Rupee	91.6	8.3	....	....	

*This booklet can be obtained from THE METAL INDUSTRY for $1. Parts 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11 appeared in our issues of March, April, May, July, September, December, 1923; June, July, August, September, 1924, and May, 1925.

†Professor of Metallurgy, School of Mines, Columbia University, New York.

	SILVER AG	COPPER CU	ZINC ZN	TIN SN	OTHER ELEMENTS
Standard	90.	10.	....	....	
Silver Solders:					
Hard	80.	13.2	6.8	....	
Sterling	80.	2.5	17.5	....	
Medium	75.	20.	5.	....	
Medium	70.	22.5	7.5	....	
Enamel	66.7	33.3	....	....	
Pure Silver	72.	28.	....	....	
French	66.	23.3	10.	....	
Plate	64.5	22.5	13.	....	
Common	62.5	30.	7.5	....	
Chain	62.5	31.2	6.2	....	
Chain	63.5	20.9	16.6	....	
Quick	62.5	20.9	10.4	6.2	
Quick	56.9	27.7	11.5	3.8	
Bureau of Standards	40.	14.	6.	40.	
Argent Francais (Roulz)	40.	35.	....	....	Ni, 25.
Argent Francais (Roulz)	33.	40.	....	....	Ni, 27.
Argent Francais (Roulz)	20.	50.	....	....	Ni, 30.
Argent Francais (Odessa)	33.25	42.5	15.75	....	Ni, 8.5
Argent Francais, Mousset's Silver	27.5	59.5	9.5	....	Ni, 3.5
Proplatinum	23.57	....	....	....	Ni, 72.; Bi, 3.72; Au, 0.71

This list will be continued in an early issue.—Ed.

Silicon—A True Fairy Tale

Written for The Metal Industry by ERNEST G. JARVIS, Vice-President, Niagara Falls Smelting & Refining Corporation, Buffalo, N. Y.

The silicon industry offers the greatest fairy tale of the twentieth century.

Silica is one of the most abundant and the cheapest materials in nature. Yet, silicon was selling in 1900 at $100 per ounce—a chemical curiosity. In 1902, Mr. Tone of Niagara Falls had developed a method for its production in the electric furnace and was endeavoring to find a market for about 100 lbs. he had made. It is twenty-five years since it was a chemical curiosity and today it brings but a few hundred dollars a ton.

Metallurgical skill, in that brief period, found many uses for silicon and as the demand grew, new processes of refinement were developed until it is now sold in carload lots.

The writer will endeavor to convey an idea of its various industrial applications as applied to aluminum alloys. While technical investigations have been carried on for some time, it was not until A. Pacz, in 1921, under the trade name "Alpax" drew the use of silicon to the attention of the aluminum industry.

For a great many years, silicon has been considered a detriment to aluminum and its alloys. The use of silicon is the first real advance in aluminum alloys since Duraluminum. While silicon aluminum alloys have not yet come into very wide use, some of the alloys promise a revolution of the aluminum industry. Alloys containing from two per cent to thirteen per cent silicon, appear to be the logical alloys whether used with copper-aluminum or aluminum alone.

These alloys are used widely for castings in Germany and France, and a fair quantity in the United States. One of the principal reasons for the use of silicon is the fact that it expands on cooling, while aluminum shrinks excessively on cooling, so that when proper proportions of aluminum and silicon, or aluminum-copper-silicon are used, shrinkage is practically eliminated. An alloy of silicon, ten per cent and aluminum, 90 per cent, has a greater tensile strength than No. 12 alloy.

Silicon-aluminum alloys do not machine as well as the silicon-copper-aluminum group. The aluminum-copper-silicon alloys cast more easily than the usual No. 12 aluminum. They pour at slightly lower temperatures which is a decided advantage; polish nicely and machine more readily than the silicon aluminum alloys or regular No. 12 aluminum.

Silicon-copper-aluminum alloys can contain various proportions of silicon up to 13 per cent and copper up to ten per cent. These alloys can be cast around hard cores without the danger of cracking, and castings containing heavy and thick sections, joining their light sections, can be cast satisfactorily without the use of chills and the tendency to draw when cooling.

A great many foundries are using silicon-aluminum 50-50 alloys, introducing from 3 to 10 pounds per hundred of either No. 12 alloy or pure aluminum to eliminate shrinkages and the use of chills with very fine results. This alloy of 50 per cent silicon and 50 per cent aluminum readily dissolves in molten aluminum, so that the introduction of the silicon is more even and with practically no loss.

Some of the important alloys and their physical properties are as follows:

Pure Aluminun.	Alloy aluminum-silicon 50-50	Aluminum-copper 50-50	Tensile strength lb. per sq. inch	Elongation in 2"
90	10	..	20,000	4.0
84	16	..	19,000	5.0
80	4	16	22,000	2.5
84	8	8	21,000	3.5
80	16	4	22,000	3.0
70	18	12	25,000	2.0
70	26	4	21,000	6.0
56	24	20	26,000	2.5
74	26	..	19,000	6.0

Electric Copper and Brass Annealing

By C. L. IPSEN, General Electric Company*

The working of copper and brass increases its hardness and reduces its ductility. With continued working the hardness of the metal reaches a point where any further reduction would cause it to break. It is then necessary to restore its softness and ductility by heating or annealing. In the manufacture of light gauge sheet or wire it may be necessary to anneal several times. A final accurate anneal of some finished products is of vital importance.

An electric furnace for bright annealing copper wire is shown in the illustration. In charging the furnace the platform with its load of copper is lowered by a hydraulic cylinder into the pit filled with water. The furnace is mounted on wheels and by means of another hydraulic cylinder is pushed into a position directly over the submerged charge of copper. Raising the platform to its original position thus places the charge inside the furnace chamber. Two platforms are provided in order that one may be unloaded and loaded while the other is heated.

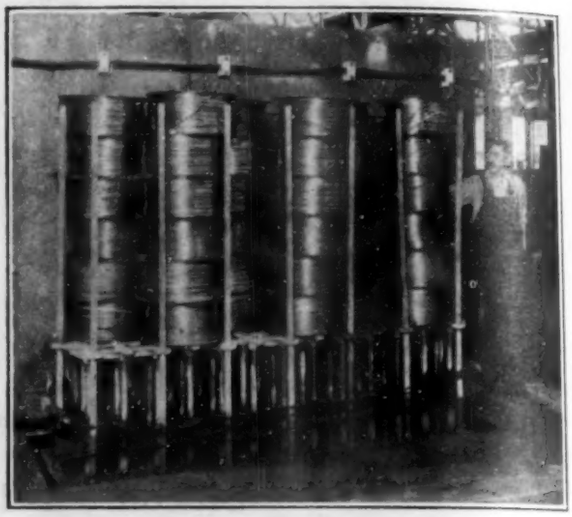
Heating units are mounted on the walls of the furnace, radiating their heat directly to the charge. Bright annealing is secured by keeping the furnace chamber filled with steam and thus excluding the air. Accurate temperature control and uniform heat distribution produce uniform results that can be absolutely duplicated in every heat.

In the fuel fired furnace mufflers are required to exclude products of combustion from the working chamber.

The chief advantages gained by electric furnaces of this type are lower costs and better and more uniform product. One company has five of these furnaces in operation with a total connected load of 900 kw.

*Abstracted from a paper read at the Convention of the American Institute of Electrical Engineers, St. Louis, Mo., April 15, 1925.

For brass annealing a large tunnel type of furnace is usually employed. One such furnace with a connected



ELECTRIC ANNEALING FURNACE

load of 500 kw. has been in continuous operation for three years. The cost of electricity slightly exceeds the cost of oil but advantages such as less scaling, more uniform hardness, and lower rejections have made the "over all" cost in the electric furnace lower. Several such furnaces are now in operation.

Plumbago Prices

From an Interview with JONATHAN BARTLEY, Graphite Expert

One of the serious matters that is confronting the foundrymen today is the phenomenal increase in the cost of graphite. Within the past six months the price has advanced nearly 100 per cent on some grades (particularly on the variety used for crucibles) and other grades are hard to get at any price. Lump graphite that sold for 5½c. six months ago is worth 9½ to 10c. today, while chips have gone from 4¼c. to 8 or 8½c., with the high grade dust very scarce. While the lower grades have not advanced in price quite to such an extent, there has been a heavy increase all around.

There are several reasons for this, the principal one being the demand. After the war hundreds of tons of Madagascar graphite were sent to the United States, much of it consigned to the shipper or some importers of other material who were unfamiliar with graphite. The result was that much of it went into storage and was bought up later on at prices as low as 1½c. per lb. This affected the American market on Ceylon to quite an extent, and in addition there was the fact that other countries began drifting from Ceylon to Madagascar. Consequently there was less demand for the Ceylon product.

Since then Germany has again become an important factor in the manufacturing line and Madagascar has not been able to supply the demand, so there has been nothing else to do but go back to Ceylon. Even France has been compelled to increase her importations from Ceylon, and the result is increased prices.

Probably the scarcity of some grades is due to the fact that the Monsoon that usually comes along in May broke out early in April this year, and it is impossible to dry the graphite during that season. But this is only a temporary matter. Cost of labor as well as everything else has advanced in Ceylon as it has over here, and this, coupled with the fact that the present price of graphite is about on par with the scale before the war would indicate that there will not be much change in prices for some time to come. All will depend how rapidly Madagascar increases her production and how far she will be able to penetrate the wall Ceylon has been building for the past 100 years or more.

American Graphite in 1924

The graphite industry in the United States suffered a considerable set-back in 1924, according to a statement given out by the Department of the Interior, as shown by figures compiled by the Geological Survey in co-operation with the State geological surveys of Alabama and Michigan. The output in 1924 was 4,971 short tons, valued at $87,510, as compared with 6,038 tons, valued at $190,944 in 1923. Of this output amorphous graphite amounted to 4,071 tons, a very slight increase as compared with 1923, and crystalline graphite amounted to 900 tons (1,800,000 pounds), as compared with 1,982 tons (3,964,000 pounds) in 1923, a decrease of 55 per cent.

THE METAL INDUSTRY

With Which Are Incorporated

THE ALUMINUM WORLD, COPPER and BRASS, THE BRASS FOUNDER and FINISHER
THE ELECTRO-PLATERS' REVIEW

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EDITORIAL

THE COPPER SITUATION

The fact that copper, unlike almost all other commodities, is selling at a price about the same as in the pre-war period has been for some time a subject of controversy and of course, discontent. Costs have risen and American consumption has increased enormously, but the price has remained low. There are two answers to this problem—foreign consumption has decreased and productive capacity has increased.

When the war ended, the world found itself with considerably over 2,000,000,000 pounds of copper stocks, including an unknown quantity of scrap, much of which was readily reclaimable in very pure form. Naturally with war demands cut off, prices slumped sharply, dropping from an average of 24.6 cents per pound in 1918 to 18.7, 17.5 and 12.5 in 1919, 1920 and 1921 respectively. The year 1922 witnessed a slight return and 1923 improved this a little to 13.4 and 14.4 respectively, but 1924 showed another recession to 13. When it is considered that a consumption of copper in the United States rose from about 400,000 tons in 1913 to about 757,000 tons in 1924, the influence can easily be perceived of the export figures and the fact that the productive capacity of American mines and refineries was so greatly increased. In 1913 about 435,000 tons of copper were exported; in 1919, only 182,000 tons. This rose steadily, however, until in 1924 to 499,000 tons were shipped out. The stocks of refined copper in the meantime fluctuated from 45,000 tons 1913 to 309,000 tons in 1919 and back to 124,000 tons in 1924.

These figures, quoted from the Year Book of the American Bureau of Metal Statistics for 1924, show not only the reason for copper's troubles, but the way out of them. Foreign consumption should some day increase to a parity with American consumption. The market is there, the necessity is there, but the financial capacity is missing. A revival of buying power has been expected for such a long time without realization that most producers have decided to be content with what Europe buys and to turn their efforts into some more immediately productive channel. American consumption is growing steadily, thanks to the basic soundness and prosperity of the country and the vigorous campaign carried on by the copper producers to educate consumers to the advantages of their metal. The only hope for an immediate rise in the price of copper is therefore the curtailment of production.

To be sure this is not a simple move. Mines and refineries have been keyed up to high gear. Foreign deposits of copper are being worked to the limit. If American producers cut down their output, they would be forced to carry the overhead of greatly expanded plants with a reduced tonnage. On the other hand foreign producers would be reaping the full benefit of the increased prices while going at full speed and with minimum costs.

Somewhere, however, there is a median line. At or about this line American producers could probably turn out less metal at a higher price, receive the same or larger total income and show an increased net profit. Such a program should be permitted and approved as entirely legitimate to conserve the resources of the country and to make it possible for the constituent parts of one of our most important basic industries to operate at a reasonable profit.

TIN ROBBERY

The recent loss of $30,000 in block tin from the warehouse of Henry I. Stettler, Inc., New York, points out to those who must stock metals, the need for unusual care. This was an extraordinary case in that the tin was in storage under the normal safeguards, but was taken out, nevertheless, through a brick wall and a ripped-up floor.

The recovery of such a commodity is obviously difficult, in spite of the fact that if it is proved that stolen goods have been sold, the buyer, no matter how long after the sale, can be held. Of course, every reputable metal firm knows that the greatest care should be used in the trade in buying tin unless the firm from which the purchase is made is known to be a legitimate dealer in metals. Nevertheless, even though 60,000 pounds of pig tin cannot be re-melted on a kitchen stove, it can be re-melted in small lots in one place or another, and once re-melted, its identity is of course lost.

The Peerless Tube Company of Bloomfield, N. J., the owner of most of the tin, has offered a reward of $1,000 for information leading to the recovery of the metal which has been marked A M C 89; L L; R R.

In connection with the theft of metals, news has been published in the daily press of the application of radio frequency oscillations by German scientists, which are said to provide a quick and easy method of preventing thefts of metals in factories or mines. To prevent workmen from carrying out copper, tin, brass, etc., in small quantities by concealing it on their persons, an electrical field is maintained in a gate through which every workman must pass on his way in and out of the plant. This electrical field is maintained with a small tube transmitter. Any metallic containers brought into this field react on the generator. The tube transmitter is tuned to an audible frequency by means of a heterodyne tube and any metals in the magnetic field will immediately change the pitch of the audible beat note. Of course, every metal lunch kit or thermos bottle will register and such articles must therefore, be deposited beside the gate.

If a similar arrangement could be worked up to turn in an alarm where metals are stored, such robberies as the one described above would be much easier to prevent

ALUMINUM DISTRIBUTION

The recent Southern Exposition, held in New York, showed clearly the fact that aluminum production in the United States is largely a Southern industry. Statistics from the United States Geological Survey show that practically all of the bauxite comes from Georgia, Alabama, Tennessee and Arkansas. The South, therefore, practically monopolizes the production of the raw material for aluminum. Large bauxite mines for this purpose primarily are located in Arkansas and Georgia, but South American bauxite is imported by some American interests.

The reduction works for producing aluminum ingot are located at Niagara Falls, Massena, New York; Badin, N. C., and Alcoa, Tenn. The location of these works must, of course, be determined by two considerations, namely raw material and electric power. The southern works obviously are well suited with respect to both of these needs, while the New York works, although at a distance from raw materials, have unusually good power facilities. Incidentally, the Niagara Falls plant is operating steadily, as it has been for some time.

Fabricating plants for aluminum are placed at Niagara Fall, N. Y.; Massena, N. Y.; Buffalo, N. Y.; Edgewater, N. J.; New Kensington, Pa.; Alcoa, Tenn.; Cleveland, Ohio, and Detroit, Mich. With regard to these plants there is the new consideration of markets to take care of while the problem of power is of lesser importance.

The aluminum industry, it seems, follows in a very general way the trend of the general manufacturing distribution of the United States. Raw materials are reduced in strategic places with respect to power and source of supply, and they are fabricated and distributed in a number of widely spread localities with populous centers offering adequate markets.

ELECTRIC POWER

Metal manufacturers will be interested in the news of the world's largest electric generating station, to be built by the New York Edison Company on 14th Street and East River, New York. This plant which will be in operation by the Spring of 1926, will cost $50,000,000 at a capacity of 700,000 kilowatts or a little less than 1,000,000 horse power, which is more than 100,000 kilowatts greater than the Muscle Shoals project. The station, it is said, will contain 9 turbo-generators, each having a capacity of 60,000 kilowatts, and additional equipment to make up the total of 700,000. Two of these turbo-generators are being made by the General Electric Company.

The coal used in the boilers for making steam to operate these turbo-generators will be laid into the bins, by traveling coal-handling towers along the river front which will have a capacity of 500 tons per hour. All of the coal will be received in this fashion at a low expense.

Aside from the immediate interest in the fact that large quantities of metals will be used in this station, we are confronted with the fact that electric power can still be generated efficiently and economically enough by coal to make it commercially feasible to build and operate such an enormous power plant on this principle. In spite of the vast development of hydro-electric power, coal still has a most important place. Each type of installation of course, has problems, advantages and disadvantages peculiar to itself, but in spite of its prosaic and old-fashioned aspect, coal still remains a great source of power and energy.

DEPARTMENT OF COMMERCE EXPANDS

Manufacturers will be interested and pleased to know that by the executive order of President Coolidge, the Bureau of Mines has been transferred from the Department of Interior to the Department of Commerce under Secretary Hoover. This move follows close upon a similar change transferring the Patent Office to the Department of Commerce. Two offices of the Bureau of Mines will remain under the Interior Department, namely those having to do with coal, oil and other mineral land leasing.

This change is eminently suitable. At one time the Bureau of Mines was concerned solely with the development of mineral lands and therefore belonged to the Department of Interior, which was engaged in fostering the development of American natural resources. Now, however, the Bureau of Mines is carrying on a large amount of research in the extraction of minerals from ores, the recovery of metals from waste materials, the use of oils in industrial works, the quality of materials for the manufacture of porcelain, and other projects which really parallel, although they do not duplicate, the work of the Bureau of Standards. For this reason, in order to co-ordinate the activities of these two scientific bureaus, it is a sound move to put them under the same directing head.

Add to this the fact that Secretary Hoover has the respect and admiration of the country for his extraordinary ability and we have a condition which is most pleasing to everyone interested in American industries.

A committee will be appointed representing the organizations of mining engineers and the mining industry to study ways and means to increase the efficiency of the Bureau of Mines and divisions of the Department of Commerce which do work of a similar character. The Institute of Mining Engineers will, of course, be represented. We suggest that metal users and manufacturers should also be included in these committees as they are of prime importance in the disposal of our mineral output. The Institute of Metals Division should have a direct representative.

CORRESPONDENCE and DISCUSSION

Although we cordially invite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein

EARLY POLISHING MACHINES

To the Editor of THE METAL INDUSTRY:

Mr. Thomas Harper's article in your May issue, on the subject of "Early Polishing Machines" is very interesting and contains some information which is well worth knowing, in regard to the polishing of metal surfaces.

It seems to me, though, that it is more interesting from the point of view of the way polishing was done prior to twenty years ago, rather than from the standpoint as to the progress of automatic polishing machines and polishing during more recent years.

In mentioning twenty years in my article, my thought was that most people would be more interested in the progress of this work during the last twenty years than in the more primitive methods prior to that time.

The machines mentioned by Mr. Harper, with one exception, never came into general use or were put on the market.

It is also a fact that many unsuccessful machines have been patented, put on and withdrawn from the market during the past twenty years. These, it would seem, are needless to discuss.

The fact remains that twenty years, or perhaps more accurately twenty-five years ago, practically all metal polishing, in a large way, was done by hand or by crude attempts at automatic polishing.

About that time the present type of automatic polishing machines were invented, patented and placed on the market, and with improvements from time to time, still continue on the market.

At that time the stove business, safe business, sad iron business and others were large and prosperous businesses and were doing their polishing by hand.

With the advent of these new machines such manufacturers, though a bit skeptical at first, soon, one after another, adopted and still continue to use these machines as regular equipment.

These machines must have had merit and originality or it would not have been possible to get a number of patents on them in this and in most foreign countries.

I would therefore repeat that Mr. Harper's knowledge of this subject is very broad, and his article is very interesting, and that while automatic polishing in a way may have existed for perhaps more years than we know of, yet automatic polishing in a large, general, practical and commercial way has existed for only about twenty or twenty-five years, and has shown many improvements and much progress during that time.

THE ROBINSON AUTOMATIC MACHINE COMPANY.
Detroit, Mich., May 15, 1925. John O. Campbell.

METAL CLEANING

To the Editor of THE METAL INDUSTRY:

In my recent article on Metal Cleaning, no bibliography nor references to the literature were attempted, the article being solely an exposition of the fact that today metal cleaning is profiting by the application of technical methods in the same fruitful way as other fields of industry, the material presented being a tying-in of ten years' practical experience in this field.

Inadvertently I trod upon the toes of the authors of a recent paper on cleaning, by non-recognition of their work. I hasten to repair this omission. A paper by Baker and Schneidewind read before the A. E. S. in 1924 presents interesting detailed information concerning an investigation on alkaline cleaning solutions.

To give all credit where it is due,—in the modern knowledge of cleaning action, much credit must also be given to the reputable and progressive concerns active in this field.

The work and the printed booklets brought before the public by such concerns as the Solvay Process Company, J. B. Ford Company, Cowles Detergent Company, International Chemical Company, Esco Manufacturing Company, Oakley Chemical Company and the Magnus Chemical Company and others, have done much to make available and useful to the industries the fundamental facts underlying good cleaning. Much of it has been done as advertising—but it has been pioneer work—and judging by the great and widespread improvements in the results attained in cleaning processes during the last decade—it has been useful and valuable work.

Brooklyn, N. Y., May 27, 1925. R. W. MITCHELL.

LUMEN BEARING COMPANY STATUS

To the Editor of THE METAL INDUSTRY:

The recent announcement of the sale of the Lumen Bearing Company of Youngstown, Ohio, to the Falcon Bronze Company, of that city, raised the question of the Buffalo company's relation to the Youngstown corporation. This sale does not change the status of the Lumen Bearing Company of Buffalo, as it is a separate and distinct New York State corporation.

The Youngstown company was organized under the laws of the State of Ohio, about six years ago. The Buffalo company was a minority stockholder and some of the individual stockholders of this company were also stockholders in the Youngstown corporation.

Lumen Bearing Company of Buffalo is one of the largest and best equipped brass foundries in the United States, and will continue manufacturing high grade non-ferrous castings, babbitts, solders, and ingot metals, as in the past. The Buffalo company is in excellent financial condition, and in addition to a first class credit rating, and sound quick assets, well in excess of liabilities, has a plant and equipment with a sound value of approximately $400,000, according to the American Appraisal Company, with no bonded indebtedness or mortgage against it.

LUMEN BEARING COMPANY.
Buffalo, N. Y., May 26, 1925.

BRASS FOUNDER'S OPINION OF US

To the Editor of THE METAL INDUSTRY:

Last week when discussing with a friend the relative merits of your METAL INDUSTRY, and other journals that treat on the same subject, I expressed my views that one number of your METAL INDUSTRY contained more practical instructive information than the others did in ten years. I have been surprised at the low cost of THE METAL INDUSTRY, while others charge three times as much. My opinion is, you ought to double your price for THE METAL INDUSTRY. My friend suggested that I send that idea to you, as I have been a regular subscriber to your journal since it was first printed.

What is wanted in these journals is instructive, helpful information to assist the practical workman to turn out better and more work. If the practical workman would see and study THE METAL INDUSTRY, we would soon have a higher class of work in brass foundries.

You have writers of unsurpassed ability. W. J. Reardon's articles on brass founding in all its branches are always dependable and will help the practical workman to solve all problems on that subject.

Probably I have worked at the business longer than the average foundryman, but on receipt of THE METAL INDUSTRY, I first look to see on what subject Mr. Reardon is writing.

BRASS FOUNDRYMAN
OF 35 YEARS' EXPERIENCE.

REVERBERATORY FURNACE BOTTOMS

To the Editor of THE METAL INDUSTRY:

I would like to tell you something about putting in a bottom in a copper reverberatory furnace bed. It should be made of the best fire brick, put in lengthways in the round of the bottom. When the furnace has been fired about 10 hours, take fire clay and bank the sides in, all the way around. Then put in some fine sand and heat, thus forming a glass bottom. One like this will last years, that is if the furnace has the right draft.

Most of the works and mills have their own way of making copper in this country, but it is not so in France, Germany, England or Wales. All the men learn to make copper from the old book, by Greenwood. As a boy I worked in the Rose Copper Works where they had 40 reverberatory furnaces, and it was there that I first saw them make copper.

C. A. SMITH.
Furnace Builder.
New York.

New Books

Acid Resisting Metals. By Sydney J. Tungay. Published by Ernest Benn Ltd., London, England. Size 5 x 7½, 136 pages. Price, payable in advance $2.00. For sale by THE METAL INDUSTRY.

A useful little volume, describing different types of acid resisting alloys, methods of testing them and their particular uses. It is not exhaustive but worth while because of its condensed form and simplicity.

The alloys covered are as follows: high silicon iron; lead and regulus metal; aluminum; stainless steels; Monel metal; cast iron and steel; nickel and chromium alloys; copper and copper alloys.

Fundamental Principles of the Mechanical Properties of Metals. By Dr. Ing. Georg Sachs. (Grundbegriffe der Mechanischen Technologie der Metalle, Leipzig, 1925, Akademische Verlagsgesellschaft, 320 pp., 232 illus.)

Within the last decade the developments in the science of metallurgy have been almost as epoch making as those in physics. The researches that are being published in the scientific and technical periodicals have become so numerous that it has become very difficult for the engineer or scientific investigator who wishes to familarize himself with the newer metallurgy to obtain a clear insight or comprehension of the subject. The difficulty has been met by the publication of a number of splendid textbooks.

The latest volume to reach us covers the fundamentals of the mechanical technology of the metals. This book is one of a series edited by the well-known metallurgist and scientist, Dr. Wm. Guertler. The author of the present volume is a former associate of Dr. Guertler and now stationed at the Kaiser-Wilhelm-Institut für Metallforschung, Berlin-Dahlen.

The book is not only a splendid compilation of most of the important investigations on the mechanical properties of solid and liquid metals, the properties of metal crystals and crystals aggregates, the changes in mechanical properties due to hot or cold drinking, heat treatment, etc., and the mechanical properties of alloys, but the book is primarily a clear and comprehensive presentation of a comparatively intricate subject.

The various theories that have been brought forward to account for changes in mechanical properties of the metals are briefly discussed. The book is divided into three sections: Section I treats of the relation between mechanical forces and the resultant changes in structure or properties of the metal, aside from any changes in crystalline structure. Section II covers the crystalline properties of the metals. Section III discusses the relation between the structure of pure metals and alloys and their mechanical properties, touching briefly upon the effect of heat treatment. A detailed bibliography is appended.—COLIN G. FINK.

Psychology in Business Relations. By A. J. Snow, Published by A. W. Shaw Company, 562 pages; size 5¾ by 8¼ inches. Price, payable in advance, $4. For sale by THE METAL INDUSTRY.

"Psychology in Business Relations" presents in a logical and interesting manner the fundamentals of psychology in business. Step by step, it explains what one needs to know about the general principles of psychology, points out the psychological factors in buying, the consumer's place in the sale, the subjective and objective influences of demand. Emphasis is placed upon methods of attracting attention, arousing interest, and securing conviction both in advertising and personal selling. Moreover, psychological methods of employment are outlined in detail.

This book tells why groups act as they do, the motives and factors that cause them to buy certain goods and reject others. It discusses the psychology of prices, trade-marks, brands and containers. To questions of advertising, the author brings a keen power of insight and analysis that not only gives facts of absorbing interest but of direct, immediate application by every business man using advertising, business letters, or selling through personal representatives. Since employment is one of the problems of any sales organization, as well as of the business as a whole, the hiring, placing, training, promoting, and paying of employees is a fertile field for the use of psychology. Dr. Snow gives a complete analysis of employment and shows how psychology is enabling employers to pick better men and to fit them into positions where they will succeed.

Technical Papers

The Nickel Plating of Zinc and Zinc-Base Die Castings. By M. R. THOMPSON.*

Various types of nickel solutions were studied from the standpoint of cathode polarization, as measured by current density-potential curves. While almost any type of solution may be used for plating on zinc if certain conditions are met, it was found that the "high-sulfate" type of solution showed superior properties in most respects. This solution seems worthy of extensive trial under commercial conditions, not only for plating zinc and die castings, but also for barrel plating on brass and steel.

$NiSO_4.7H_2O$	0.5 to 1.0	70–140	9–19
H_2BO_3	0.25(M)	16	2.1
NH_4Cl	0.25	13	1.7
Na_2SO_4 ..... (anhydrous)[1]	1.5 to 3.0	107–213	14–28

The working conditions indicated for the high sulfate bath upon zinc and die castings are:

(a) An average cathode current density from 1.5 to 2.0 amp./sq. dm. (14-19 amp./sq. ft.) on flat and simple shapes, and up to 3.5 to 4 amp./sq. dm. (33 to 37 amp./sq. ft.) on very complicated or recessed shapes.

(b) The probable bath voltage is between 1.5 and 3 volts, according to conditions. It should be noted that the same bath voltage as is used for ordinary solutions will result in a higher and possibly excessive current density on account of the greatly increased conductivity. **A combination of control by current and voltage is therefore desirable.**

(c) The average anode current density should preferably be below 2 amp./sq. dm. (19 amp./sq. ft.) to avoid "gas polarization." This involves keeping plenty of clean anodes in the tank. High-grade cast anodes are preferable to electrolytic.

(d) **The control of pH is very desirable** and the favorable range so far observed is from 5.5 to 5.8. The pH usually tends to increase when these solutions are operated at a high current density.

(e) Movement of the work, as in mechanical plating tanks, etc., is desirable, especially at high current densities, to prevent "burning" on exposed parts.

The properties of the high-sulfate bath make is especially suitable for barrel plating on steel and brass.

A New Method for Zinc Coating Wire. By J. L. SCHUELER.*

This paper deals with "galvannealing," a new hot process for zinc-coating wire. A brief comparison is made between the ordinary hot zinc-coating processes and galvannealing. The new process differs from the old processes in that wiping of the coating is obviated and a new step introduced—heat-treatment of the zinc coating—which smooths the coating, distributes it uniformly around the surface of the wire and makes the heavy coating malleable and flexible. The process is in daily use, and several thousand tons of wire have been successfully zinc-coated. Methods for analyses of coatings are briefly discussed, including the Preece or copper sulfate test. The galvannealed coating is shown to be composed of an outside layer of zinc; an intermediate layer of $FeZn_{10}$; inside layers of $FeZn_{10}$ and $FeZn_7$; and finally a layer of $FeZn_7$ next to the surface of the wire.

*Abstract of a paper presented at the Forty-seventh General Meeting of the American Electrochemical Society held in Niagara Falls, April 23, 24 and 25, 1925.

[1] The factors for converting the equivalent weight of anhydrous to crystallized sodium sulphate ($Na_2SO_4.10H_2O$) and vice versa are 2.27 and 0.441, respectively. In practice, it will probably be most convenient to use the anhydrous form on account of the saving in bulk and freight. The transition point from crystallized to anhydrous salt is at 32.5° C. (90.5°F.) The principal impurities to be expected are iron and either free acid or alkali, according to the source.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ASSOCIATE EDITORS { WILLIAM J. REARDON, Foundry / JESSE L. JONES, Metallurgical
PETER W. BLAIR, Mechanical. CHARLES H. PROCTOR, Plating-Chemical
WILLIAM J. PETTIS, Rolling Mill. R. E. SEARCH, Exchange-Research

ACID ZINC SOLUTION

Q.—What zinc solution will give a deposit to stand 14 Preece Test dips?

A.—An electro-zinc deposit that will withstand the action of 14 one-minute immersions in a saturated copper sulphate solution according to the Preece test would have to have thickness of deposit equal to one oz. or more of metallic zinc per sq. ft. of surface. It is possible that one hour's deposit in the following solution will give results but the deposition, first from a cyanide, then an acid solution is more effective: water, 1 gallon; zinc sulphate, 3 lbs.; common salt, 8 ozs.; acetic acid, ½ oz., glycerin, 1/16 oz. The solution would have to be air agitated to enable the maximum amperage to be carried. Voltage 4 to 5.—C. H. P. Problem 3,362.

BLISTERED COPPER SOLUTION

Q.—How can I keep the following solution from blistering?

Copper cyanide	4 ozs.
Sodium cyanide	4½ ozs.
Bicarbonate of soda	¾ ozs.
Bisulphite of soda	½ ozs.
Water	1 gal.

A.—Add ¼ oz. of caustic soda and ½ oz. bisulphite of soda per gallon of solution. It may also be necessary to add ½ to 1 oz. of sodium cyanide.—C. H. P., Problem 3,363.

BRASS BANJO KEY

Q.—We are trying to turn out a cast brass banjo key. First, we made a solid casting, from pattern, drilling out and broaching the opening to take hexagon nut. These turned out fairly well, providing the machining was correctly done. Second, in order to do way with drilling opening, we tried to cast a core, but have been so far unable to make a core that would stand up, and not break in the handling or pouring, have used graphite, molasses and core sand in mixture, and inserted wire and nails to strengthen core, but to no purpose.

A.—On the examination of the samples we find one of these samples was evidently cast with a chill core which is rather hard to get the grade of yellow brass you are using to lay on a chill core, hence a blow. This job will work very nicely in a permanent mold cast in aluminum bronze as this alloy lies very well in die molds. The mixture is 90 per cent copper, 10 per cent aluminum. However, you should not have any trouble in sand core for this job. We suggest the following mixture: 40 parts silica sand; 10 parts molding sand; 1 part linseed oil.

This will give a hard open core and should give you the desired results. It may be necessary to use a small brad as a wire to hold the core.—W. J. R., Problem 3,364.

BRASS SOLDER

Q.—In the January issue of the "Metal Industry" I noted with keen interest on page 29 a formula for self-fluxing solder for steel and gilding. Will you kindly advise me if there is an effective self-fluxing solder which can be used on brass?

A.—If this solder will hold on steel and gilding metal it would also hold on brass. Brass takes solder more easily than steel.—W. L. A., Problem 3,365.

COVERING SCRATCHES IN STEEL

Q.—How can I get rid of scratches in steel? Can I grind them bright and hide them with copper before plating?

A.—There is only one way to remove deep scratches from steel and that is to polish them out. Copper deposits will not fill them up. After polishing, as you now do, cut the steel down afterwards with a good sized tampico bristle brush wheel; run the same as a polishing wheel. This additional method may smooth down the scratches.—C. H. P. Problem 3,366.

CYANIDE COPPER SOLUTION

Q.—My anodes in a cyanide copper solution coat over with a bluish slime. What causes it?

How can I use an old 120 gallon carbonate solution to make up a 260 gallon cyanide solution?

How many horse power will be required to drive a 6 volt, 5 ampere generator?

A.—The coating of the anodes with a bluish slime still indicates that the copper solution is deficient in free cyanide. You do not state how much cyanide and other factors you have added to the solution to remedy the condition. We are going to make two suggestions and want you to make the tests with ten gallons of your solution.

First add a half oz. of caustic soda per gallon, then 1½ ozs. of bisulphite of soda. Work the solution with a high current and note the results. If the anodes coat under the high current, then add sodium cyanide 1 oz. or more per gallon. In the second test solution, add from 2 to 4 ozs. of Rochelle salts. Note results, then add sodium cyanide a half oz. upwards per gallon. One or the other additions will remedy the anode coating.

For building up a new copper solution, you can use the 120 gallons of old copper solution as a basis for the 260 gallon new solution. Then add about 3½ ozs. sodium cyanide and 3 ozs. copper cyanide for each additional gallon of solution. Then add 1 oz. bisulphite of soda per gallon of new solution. We suggest you proceed as follows: Put about 70 gallons of water first in the tank at 140° F., then dissolve the sodium and copper cyanide; add the balance of 70 gallons of water to make up the 140 gallons. Now add the 140 ozs. sodium bisulphite a little at a time, 2 or 3 lbs. and mix thoroughly. Now add the 120 gallons of old solution. The solution so prepared should give excellent results. Make up a ten gallon test solution and try it out.

The following figures will give you a basic idea of the horse power required to drive a generator of 6 volts 500 amperes. 746 Watts equals 1 H. P.; it will require approximately 4 H. P. to drive your generator to full capacity or load.—C. H. P. Problem 3,367.

DIE CASTINGS

Q.—At the present we are making lamp castings from gray iron but are thinking of changing over to white metal or white brass. The information that would help us at the present is the proper kind of melting equipment to install. We would also like to know where to obtain the proper kind of metal for making these castings. We might state that some of the white metal castings that we have seen out by the lamp manufacturers are very brittle and seem to break very easily. Others seem to have about the same strength as gray iron.

A.—Any good gas-fired furnace with iron pots will do, but the flame should not come in contact with the metal. The molds are made of iron or steel. The best metal for your purpose is a zinc-base alloy, say 88 zinc, 8 tin and 4 copper. A number of firms make a business of manufacturing die-castings for others. You will undoubtedly do best to have them made in this way, in the beginning at least.—W. L. A., Problem 3,368.

ETCHING BRASS TUBES

Q.—Please publish a solution for etching brass tubes and a solution for etching so-called nickel silver. Designs are to be etched about .005 to .010 deep. What method would be most practical? What resist should be used? Could the resist be applied to a rubber stamp resign and then rolled on to the tubes and then etched?

A.—Chloride of iron is the best factor for etching brass. For nickel silver try iron nitrate or a nitric acid solution, 1 part acid, 4 parts water. The chloride of iron and nitrate of iron proportions best suitable are from 4 to 16 oz. per gallon of water. If a rubber roller stamp is used then a thick black printer's etching ink should be used.

The transfer method is also used. It consists of printing the

details upon special transfer tissue paper obtained from an etched copper plate. The paper should be slightly moistened with glycerine before printing, the transfer, applied to the tissue paper from the copper plate by the aid of the heavy printing ink, is then applied to the metal surface to be etched and pressed firmly. The paper is then removed and the ink transfer remains. It is some times necessary to moisten the reverse side of the transfer paper with denatured alcohol to effect its release. The glycerine however, usually gives the desired results.—C. H. P., Problem 3,369.

GOLD ON BASS HORN BELL

Q.—We are attaching a diagram of a large Bass Bell with notations made by our Superintendent, who would very much appreciate any suggestions or information you may offer that will help him solve the difficulty he is having in gold plating.

A.—The methods you use as per sketch submitted to us seems to be the only practical methods you could use in gold plating the bell of a large bass horn. The difficulties that you have to contend with, so far as the gold deposit is concerned, are primarily due to anode and solution conditions.

1. What is the comparative surface area of the gold anode surface as compared with the area of the cathode or surface of the bell to be plated? We presume not one inch as compared with twenty inches or more of cathode surface? A circular anode of gold should be used 2 inches in diameter, at least ⅔ circumference of the bell. The circular anode should be so arranged that it can be moved to and fro towards the outer edge of the bell. Such an anode, and agitated movement, would insure a uniform gold deposit that should burnish easily and satisfactorily without unnecessary effort. Pure gold is naturally soft. It is your methods of plating that makes it hard. The alternative to the gold circle anode would be to use an anode of similar dimensions made up from pure rolled sheet nickel, which is insoluble, then use an anode of gold in the center of the horn. The agitation of both anodes should take place as noted before. It will be necessary to add gold preferably in the form of sodium gold cyanide (which is just soluble in water). This solution, containing no free cyanide, will readily combine with the free cyanide that constantly develops in the solution, being operated in the bell, due to the fact that the gold is more rapidly withdrawn and deposited than replaced. Due to the comparatively small anode surface, such a condition produces a hard gold. With the additions of small amounts of pure caustic potash as a conductor to the solution, and a similar amount of bisulphite of soda, say from ⅛ to ½ oz. each per gallon of gold solution, you will obtain the soft gold deposit you desire for your product. We do not advocate the buffing of your product, as it cuts away gold and therefore reduces its thickness. All that is necessary after gold plating is to rub down the surface with very fine silver sand, known as glass sand to produce a semi-lustre. Then burnish as usual.

Soap makes the best lubricant. The addition of very small amounts of tri-sodium phosphate to the soap solution produces a softer soap solution. Try borax soap chips with the tri-sodium phosphate addition and water.

Color buffing is sometimes used in connection with gold plating after burnishing to eliminate the uneven surface. This consists of buff wheels made from Canton flannel; the polishing medium is the finest powdered gold rouge procurable. This is then mixed with denatured alcohol. If a little cutting is necessary, the same rouge is mixed with the finest ivory black and kerosene oil to a paste. Sheepskin wheels would be preferable for the cutting.—C. H. P., Problem 3,370.

GREEN BRASS PLATE

Q.—What causes a green brass deposit?

A.—A green brass deposit indicates an excess of zinc. Add from 1 to 2 ozs. bisulphite of soda per gallon of solution; to bring up more copper add ½ to 1 oz. more sodium cyanide per gallon. An excessive amount of ammonia whether salts or liquid produces a green brass.—C. H. P. Problem 3,371.

GUN BLUING

Q.—In Problem 3323 in your February issue you describe gun bluing with nitrate. I tried it and melted the top and bottom ribs loose from the gun What was wrong?

A.—You certainly must have used an excessive temperature to melt the brazing that separated the top and bottom ribs from the barrel. Problem 3323 is used extensively for bluing guns and pistols. Be careful not to exceed the 700°. You could use the steel tank if it is absolutely tight and leak proof at high temperatures.

The following solution might answer your purpose. It is used in producing a gun metal finish on barbers' shears. Water 1 gallon; caustic soda 73-76% 4 lbs.; nitrate of soda 2-3 ozs. Heat the solution to boiling which will be about 300°. Immerse the bright and clean gun parts in the solution until a dark blue color results, then wash them in cold and boiling water and while still hot, wipe down with a cloth moistened with pure lard oil. This method should give you a good finish.—C. H. P., Problem 3,372.

HYDROGEN PEROXIDE SOLUTION

Q.—How can I prepare a hydrogen peroxide solution?

A.—In one gallon of pure clean water heated to 120° F. dissolve one and one-third pounds of sodium perlixate. When completely dissolved add sufficient pure muriatic acid until the solution shows an acid reaction to blue litmus paper about equal to your nickel solution. This solution will be ample for 1,000 gallons of nickel solution, maximum or when the pitting is very small; for 250 gallons when the pitting is excessive.—C. H. P., Problem 3,373.

IMITATION GREEN GOLD

Q.—What is a good solution for imitation green gold?

A.—The following formula gives excellent results: Water, 1 gallon; sodium cyanide, 5½ ozs.; Copper cyanide, 1½ ozs.; zinc cyanide, 3 ozs.; nickel cyanide, ½ oz.; sal ammoniac 1 oz. Dissolve the sodium cyanide, copper, zinc, and nickel cyanide in one third the water at 140° F. Then when all dissolved, add the balance of the water cold and then the sal ammoniac. It may be necessary to add ½ oz. bisulphite of soda to bring up the copper. (Do not add unless necessary). Temperature 160° to 180° F. at 3 to 4 volts. Use rolled or sheet nickel or a green brass anode.—C. H. P., Problem 3,374.

MOLDS FOR WHITE METAL

Q.—What kind of molds should we use for casting white metal (babbitt and lead)? We are now using cast iron and getting poor results.

A.—Cast iron molds are not satisfactory for casting white metals such as antimonial lead, babbitt metal, etc. The molds should be made of bronze. You can improve the mold so that the castings will release or part more freely from the face by applying very finely powdered red rouge. To apply, mix the rouge with water to a thin paste; then heat up the mold at 212° F. or more; then apply the rouge mixture with a soft brush, such as a painter's sash brush, to the heated mold until the inside is uniformly coated with a red coating. As the coating wears off, re-apply it.—C. H. P., Problem 3,375.

REMELTING OLD ZINC

Q.—Could you advise us of any processes for remelting old zinc; how to get a good product and how to hold down the losses?

A.—The process of smelting old zinc to get a good product is very simple. All that is required is a cast iron kettle similar to the babbitt kettle used for such work. Do not let the metal get too hot and use salammoniac as a flux. Pour into the flat zinc mold similar to shape and size used by Prime Western Brand. The molds are made of cast iron.—W. J. R., Problem 3,376.

REPLACING ZINC

Q.—The question that I wish to ask is, suppose I make a mixture as follows: copper 87, tin 10, lead 10, zinc 3, pour off the heat and then clean up the gates and sprues and charge back in the furnace, what new metal if any will have to be added to the sprue to make the mixture as given above. We melt with an oil furnace and compressed air.

A.—We would suggest to add ½ lb. of zinc to one hundred pounds of gates and if your melting is done properly your mixture will be the same as the original mixture.—W. J. R., Problem 3,377.

RUST PROOF NICKEL

Q.—Is it advisable to copperplate before nickel to prevent rusting?

A.—The deposition of copper previous to nickel plating does not prevent rusting to any great extent. It does, however, give a good clean surface on the steel on which to deposit the nickel. We do not find it necessary to brush the copper plated surface before nickeling. A thorough washing in cold water is all that is required. We are able to produce a rust-proof nickel deposit on steel as follows:

1. Plate in the nickel solution for 5 minutes.
2. Plate in the copper solution for 5 minutes.
3. Plate in the nickel solution from 30 minutes to 1 hour.
4. Then polish to a lustre finish as usual.—C. H. P., Problem 3,378.

STEEL PLATING TANK

Q.—In Problem 3329 in your February issue you describe a rust-proof nickel for steel. Can I use this in a steel tank?

A.—Not unless the tank is coated with asphaltum. You could use it for cyanide copper solution.—C. H. P., Problem 3,379.

STREAKY COPPER PLATE

Q.—I have a cyanide copper solution made up as follows: sodium cyanide, 6 oz.; copper carbonate, 4 oz.; sodium bisulphite, 2 oz.; water, 1 gallon. Spun shells plate unevenly and come out streaky.

A.—Your cyanide solution lacks free cyanide and possibly conductivity. Add to the solution, first 1 oz. of sodium cyanide per gallon and 1 oz. caustic soda. The results should be at once apparent in a uniform deposit of copper. It may however, be necessary to add 1 oz. more sodium cyanide per gallon later. If the copper deposit that results is a deep red, somewhat hard afterwards, then add a little more hyposulphite of soda, not more than ¼ oz. at any one time.

The brass castings that you find difficult to plate in an acid copper solution presumably contain aluminum. Coat some of them first in a copper cyanide solution or a nickel solution, then note results.

You can also try the following additions per gallon: First try a test solution of 10 gallons or so. Add 2 to 4 ozs. sulphuric acid; 1 oz. powdered alum and ¼ oz. yellow dextrine. It is possible that the addition of the acid alone may remedy the solution condition.—C. H. P., Problem 3,380.

STRENGTH OF PLATING SOLUTIONS

Q.—Please give us the proper strength for nickel, brass, and copper solutions. Our solutions stand ten, twelve and fourteen Baumé respectively.

A.—Baumé specifications mean nothing unless the original basic formula is known. Any material that is soluble in water will raise its density, so we can only reply that if your solutions were originally correctly proportioned, then the specific gravity you mention is satisfactory. A standard nickel solution should not contain less than 3 to 3½ ozs. of actual nickel per gallon of solution. Single nickel salts contain 22 per cent metal or 3.57 ozs. per lb.; double salts contain 2.22 ozs. per lb. or 14 per cent. Copper solutions should not contain less than 2.80 ozs. metal per gallon of solution. Copper cyanide contains 11.21 ozs of copper per lb. or 70 per cent metal. Brass solutions should contain approximately the same amount of metal, that is total copper and zinc. Zinc cyanide contains 8.80 ozs. of zinc or 55 per cent.—C. H. P., Problem 3,381.

TIN SOLUTION

Q.—Will you be kind enough to give us complete information about the make-up and operation of a tin solution to produce an imitation silver finish on steel.

A.—One of the best electro-tinning solutions is prepared as follows: Water, 1 gallon. Sodium stannate 1¾ pounds. Soluble tin salt, 4 ozs. Powdered white starch, ⅛ oz. Temperature of solution up to 180° F. anodes either sheet steel or sheet tin, preferably straits tin not less than ⅛" thick. The voltage, 2 to 3. Upkeep of solution as follows:

1. Maintain the water line at all times.
2. As the soluble tin salt is absorbed from the bottom of the solution and the tin solution becomes clear add more soluble tin salt, 1 oz. or more per gallon of solution.—C. H. P., Problem 3,382.

VERDE GREEN ON EXTRUDED BRASS

Q.—How can I get a Verde Green finish on extruded brass —copper 56; zinc, 42; lead, 2?

A.—Some of the formulae for Verde green finishes in Platers' Wrinkles can be applied to your alloy. Try this formula and apply with a brush: Water, 3 quarts; muriatic acid, 1 quart; verdigris or acetate of copper, 3 lbs.; copper carbonate dry, ½ lb.; white arsenic powdered, ½ lb.; sal-ammoniac, 3 lbs.

To prepare the solution, dissolve the verdigris, copper carbonate and sal-ammoniac in the water at 140-160° F. Heat up the muriatic acid and dissolve the arsenic therein; when dissolved, add to the solution first prepared. If this solution does not give the desired results when prepared as outlined, it may be necessary to copper plate the surface of the bronze or extrusion metal to give the desired surface for verde green. The copper surface can be perceptibly darkened with a weak solution of polysulphide or liver of sulphur, ⅛ oz. of either material per gallon of warm water. The lead content of the extrusion metal presumably causes your greatest difficulty in the production of the verde finish with any formula given in Platers' Wrinkles, but the deposition of copper will eliminate the trouble.—C. H. P., Problem 3,383.

WHITE GOLD SOLUTION

Q.—What is a good 14K white gold solution?

A.—It is difficult to produce a true 14K. white gold finish with any type of solution. The finish always has a greenish tint. Nickel does not deposit to any extent from a cyanide solution, so it is necessary to use cadmium or possibly tin. You can purchase cadmium oxide and dissolve it with twice its weight of sodium cyanide in hot water. Cadmium oxide contains 82 per cent metal. The tin salt should be sodium stannate, which is soluble in water and can be added direct to the white gold solution as required for color. The following formula for 14K. white gold solution gives very good results: water, 1 gallon; sodium cyanide, 2½ ozs.; sodium gold cyanide 46%; fine gold ⅝ oz.; cadmium oxide, ¼ oz.; silver Cyanide, ⅛ oz.; caustic potash, ½ oz.; sal-ammoniac, ½ oz. Voltage 4 to 5. Temperature normal. Anodes 14K. white gold.—C. H. P., Problem 3,384.

WHITE SPOTS ON NICKEL

Q.—What causes white spots on nickel plate?

A.—We are unable to decide just what causes the white spots without an analysis of the solution. We would suggest that you add to the nickel solution, 1 oz. boracic acid; 1 oz. sal-ammoniac; ⅛ oz. pure muriatic acid and 5 grains of cadmium chloride per gallon of solution. Try these additions in a 10-gallon test solution first. You should obtain a bright uniform nickel deposit from the test solution, providing the nickel solution contains ample metal. Your problem is interesting. Let us know the results.—C. H. P. Problem 3,385.

ZINC ON IRON

Q.—Can you advise me regarding the best and most economical rust-proofing process for iron castings?

A.—For full detailed information covering "hot galvanizing process," procure a copy of Galvanizing and Tinning by Flanders.

You apparently do plating, so possibly the best zinc plating solution you can install for cast and malleable iron and steel is the following: Water, 1 gallon; zinc sulphate, 3 lbs.; common salt, 8 ozs.; acetic acid, ½ to 1 oz. Temperature 80° F. Voltage 2½ to 4. Anodes electrolytic zinc, ½ per cent mercury alloy. Any wooden tank can be used. Cost per gallon of solution 12 cents.—C. H. P., Problem 3,386.

PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

1,530,614. March 24, 1925. **Method for Metal Coating.** Henry W. Pleister, Westfield, N. J., assignor, by mesne assignments, to Diamond Expansion Bolt Company, New York.

A process comprising applying molten metal to an article; then subjecting the article to planetary motion.

1,531,140. March 24, 1925. **Method of Forming Electrodeposits.** George Schneider, La Vale, Md., assignor to The American Cellulose & Chemical Manufacturing Company, Ltd., New York, N. Y.

The method hereinbefore described of forming a metal deposit upon an object to be plated, which consists in first forming on the surface of the object an intermediate deposit of a mixture of arsenic and one of the heavy metals, and then depositing a plating metal on such treated object until a plating of the desired thickness is obtained.

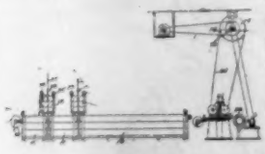
1,533,118. April 14, 1925. **Metal Bearing.** James G. Kelly, Albert L. Pringle, and Holmes Hall, Sedalia, Mo.; said Pringle assignor to said Kelly and Hall.

A metal bearing composed of aluminum, tin, and lead, with the aluminum constituting approximately one-sixth (1/6) of the whole, and the remainder consisting of lead and tin, each being present in substantial amounts, but the tin in a predominating quantity.

1,533,447. April 14, 1925. **Apparatus and Process for Electroplating Metal and Forming Articles Therefrom.** George W. Newman, Chicago, Ill., assignor, by mesne assignments, to Wilson-Jones Loose Leaf Company, Chicago, Ill., a corporation of Massachusetts.

The method of treating metal, which consists in first subjecting the same to an electrolytic bath to cleanse the same and to remove a portion of the surface thereof, and then plating said surface.

1,533,473, April 14, 1925. **Metal-Coating Process.** Robert Jay Shoemaker, Chicago, Ill., assignor to Leadizing Company, Chicago, Ill., a corporation of Illinois. Method of plating a metal article with lead or tin which consists in subjecting the surface to be plated to contact with a molten bath containing a chloride of the plating metal capable of reacting with the metal to be plated to form a chloride of said metal to be plated and to produce deposition on said surface of a thin, dense, adherent film of the plating metal, then bringing the plated surface into contact with a solvent of the salt of the plating metal, at fusion temperature, and washing the article.



1,533,539. April 14, 1925. **Method of Uniting Pieces of Certain Alloys to One Another or to Other Metals or Alloys, a Flux for Use Therein, and the Product Thereof.** Henry Prentiss Cleveland, New York, N. Y.

A method of uniting one or more pieces of a chromium cobalt alloy, or the like, to one another or to other metals or alloys, comprising applying a flux containing a fluorine compound and brazing the parts together with brass.

1,533,892. April 14, 1925. **Casting Freely Oxidizable Metal.** Harold H. Osborne, Cleveland, Ohio, assignor to American Magnesium Corporation, Niagara Falls, N. Y.

A sand mold having a binder containing glycerine.

1,534,105. April 21, 1925. **Flux for Magnesium and Alloys Thereof.** John A. Gann, Midland, Mich., assignor to The Dow Chemical Company, Midland, Mich., a corporation of Michigan.

In a method of preparing a flux for use with molten magnesium and alloys thereof, the steps which consist in intermixing the proportionate amounts of sodium and calcium chlorides, such calcium chloride being in hydrated form, heating until such calcium chloride is dehydrated, adding to the molten mixture a magnesium chloride salt retaining water of crystallization, and heating the resulting mixture until such water is driven off.

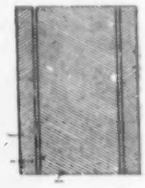
1,534,316-1,534,322, inclusive. April 21, 1925. **Aluminum Production, Methods and Equipment.** Wm. Hoopes, Pittsburgh, Pa. Francis C. Frary, Junius D. Edwards and Basil T. Horsfield, assignors to Aluminum Company of America, Pittsburgh, Pa.

Various methods and types of cells for producing and refining metallic aluminum.

1,534,770. April 21, 1925. **Composition of Material.** Harry C. Claflin and Adelbert Schade, Nitro, W. Va.

A bearing metal consisting of lead, magnesium and sodium, the proportion of magnesium being from two to six per cent of the whole and the proportion of sodium being from one to three per cent of the whole.

1,534,928. April 21, 1925. **Method of Coating and Alloying Metals.** James J. Dugan, Wilmington, Del. The method of forming a metal ingot comprising a steel core having a casing of non-ferrous metal weld-united thereto, which comprises introducing into the mold, a casing composed of the non-ferrous metal in the form of a solid of predetermined thickness, and while this casing is initially at substantially atmospheric temperature, filling said casing with molten steel heated to a temperature of not substantially below 2,800° F., by pouring the steel into said casing in the mold, to completely fuse a desired depth of the inner surface of the non-ferrous metal.



1,535,318. April 28, 1925. **Apparatus for Electroplating.** Irvin John Koehnline, Bridgeport, and William Earl Armstrong, Martins Ferry, Ohio.

In electro-plating apparatus, a tank for containing an electrolyte, a table arranged for rotation within said tank, an upright shaft about which said table rotates, means for driving said shaft, a sleeve splined on said shaft and rigidly attached to said table, anodes removably mounted on said table, means for holding articles to be plated on said table in spaced relation to said anodes.

1,535,339. April 28, 1925. **Process for Electrolytically Depositing Elemental Chromium Upon Metals.** Samuel Peacock, Wheeling, W. Va.

The process of coating a metal with chromium, which consists in preparing a fused bath of an alkali metal chromium fluoride; adding to said bath a basic sodium silicate; employing the metal to be coated as the cathode in said bath, and plating out the chromium present by passing a current from said bath to said cathode.

1,535,400. April 28, 1925. **Method and Apparatus for Forming Tubing Electrolytically.** Rufus Crowell, Winchester, Mass.

The method of making tubes by electro-deposition, which comprises moving a cathode mandrel in an electrolyte bodily adjacent to a series of anodes and rotating said mandrel about its axis while subjected to the passage of an electrolyzing current, and then stripping the deposit on the mandrel therefrom.

1,537,046. May 5, 1925. **Anode.** Maurice E. Louth, Kokomo, Ind., assignor to Udylite Process Company, Kokomo, Ind.

An anode for use in electroplating, comprising a plurality of bodies of active material and a support of inactive conductive material, including a plurality of studs of inactive conductive material, each having one end embedded in one of said bodies of active material.

1,537,053. May 5, 1925. **Process of Coloring Cadmium.** Arthur White Young, Kokomo, Ind., assignor to Udylite Process Company, Kokomo, Ind.

Process of coloring cadmium and cadmium coated articles, which comprises contacting an article to be colored with an ammoniacal solution of ammonium molybdate, maintained at a temperature of from 100° F. to 180° F., in an electrical circuit in which said article serves as the cathode.

SPRAY PATENT LITIGATION

A final decree has been issued Walter J. Smart, and the Eureka Pneumatic Spray Company, of Richmond Hill, Long Island, New York, against Armando H. Costa and John A. Thatcher, doing business under the name of Superior Spray Company, restraining them from violating "Letters-Patent," numbered 1,232,618, granted to Walter J. Smart on July 10, 1917, for Spraying or Atomizing Device, declaring said patent good and valid in law; and Smart the legal owner thereof, and the plaintiff corporation the exclusive licensee thereunder.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

The Baynes Color Process of Etching

Prepared for The Metal Industry by JOHN R. BAYNES, Norwich, Conn.

This process is a simple, American method of producing beautiful colored metal work which is similar in effect to the cloisonne and lacquer work of the Japanese. Its uses are practically unlimited, as it can be employed on a great variety of metals, which include sterling silver, nickel silver, brass, bronze, copper, zinc, aluminum and Britannia metal. The process works equally well on either flat or curved surfaces and can be used on such articles as trays, vases, electric fixtures, portable lamp bases, radio panels, vanity sets, vacuum carafe cases and metal novelties of various descriptions which can be attractively decorated by its use.

To do this color work, the direct transfer process is the one employed. In working this process, a plate press should be used for making the prints which are to be transferred to the metal to be decorated. Direct transfer etchings are made in the following manner: A flat copper plate of about No. 15 or No. 16 gauge is either engraved or etched with the design or pattern to be reproduced. The incised lines or figures in the plate will represent the parts of the pattern that are to appear in relief on the objects to be ornamented. The design on the copper or master plate must be the same size as the required reproduction. If an engraved plate is to be used, it should be cleanly and sharply cut.

If an etched plate is to be used, proceed in the following manner: Make an ink drawing on white Bristol board, having the inked lines or black parts of the drawing represent those to be sunken in the etchings to be produced. The drawing should be two and one-half times as large as the etching required; or, in other words, two and one-half times as long and two and one-half times as wide. A photographic wet plate negative is made from this drawing to the required reduction and printed on a copper plate by the photo-glue enamel process, and then etched from four to five minutes with a strong solution of perchloride of iron. Nearly all photo-engraving concerns are equipped to do this class of work.

After the master has been made by either of the above methods,

Fig. 1. Flat Piece of Brass Colored in Blue and Green
Fig. 2. Spun Brass for Electric Fixture
Fig. 3. Drawn Brass One-half of a Carafe Case
Fig. 4. Part of a Portable Brass Base
Fig 5-6 Stamped Flash-light Shells, Showing Use of Baynes Mattes

ARTICLES ETCHED BY THE BAYNES PROCESS

it is filled in with a special transfer ink, which is as follows:

SPECIAL TRANSFER INK

Beeswax	16 ozs.
Black pitch	8 ozs.
Bayberry wax	4 ozs.
Venetian turpentine	3 ozs.
Lamp black	4 ozs.
Turpentine (spirits)	8 ozs.

Melt the beeswax, black pitch and bayberry together, add the lamp black and stir it in thoroughly. Remove from fire, add the Venetian turpentine with the spirits of turpentine and stir again.

The master plate is now ready for printing. This is accomplished by forcing the ink into the lines or depressed parts of the plate by the use of a small smooth-edged putty knife. A second and broader putty knife, also having a flat smooth edge, is then used to scrape off any ink that may remain on the surface of the plate.

When a master pattern is properly filled, the surface will be clean and free of ink, and all depressions will be filled even with the surface of the metal. When in the above condition, the plate is placed in the center of the bed of the press, a piece of transfer paper is laid on the plate and over this a woven felt blanket. While in position, as thus described, the upper roller of the press is pulled over and drives the felt down on the transfer paper, which in turn is forced against the master and the ink it contains. After the roller has passed over the blanket, the felt is removed and the print drawn from the plate.

To transfer the ink to the objects to be etched, first trim the paper prints. Then place them, face down, on the objects and rub the backs of the prints gently with the fingers until the ink adheres to the metal. Each print should be rolled down in perfect contact by the use of a small felt-covered roller.

The transfer paper is moistened and removed, leaving the ink transfer in its proper position ready for etching.

The article is immersed in a suitable etching bath, etched for a few minutes, rinsed in clean cold water, and allowed to dry. It will be found that the surface of the metal that has been exposed to the acid has been cut down and the figures or lines of the metal that are to appear bright against a colored background are in slight relief and still covered with the transfer ink. While in this condition the desired color is applied in liquid form by the use of an air brush. The color should be sprayed evenly and smoothly all over the article, covering the etched background and the transfer ink at the same time, then allowed to dry. When dry, the sprayed color or enamel will be found to adhere very firmly to the background or etched parts of the metal, but not so to those covered by the transfer ink. The transfer ink prevents adhesion of the enamel to the metal on account of its waxy nature. The ink is now removed with benzine, which also takes away the film of colored enamel covering it, and shows the bright metal lines that have been protected by the transfer ink surrounded by the color.

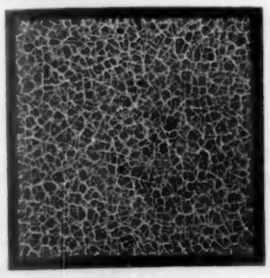


FIG. 7

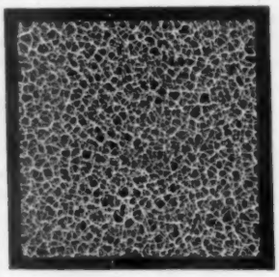


FIG. 8

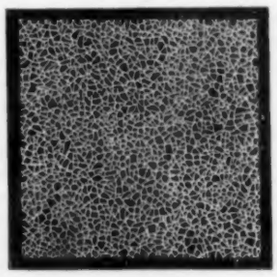


FIG. 9

BAYNES' MATTES

The article is then sprayed with a clear lacquer, which protects the metal from oxidation.

BAYNES' MATTES

Figs. 7, 8 and 9 show the Baynes' mattes. These are particularly attractive in connection with the color process. The white lines representing relief metal are used for the separation of color to produce cloisonne effects.

These are obtained by flowing an acid resist over flat copper plates. In drying, the resist contracts form beautifully even matte patterns, which are then etched in the copper. The resist, in drying and contracting, never takes the same forms; there is always a distinct difference. However, the fineness or coarseness of the lines can be determined largely by the thickness or thinness of the fluid resist that is poured over the copper. For fine lines it is used thin, and for broad lines the fluid is poured thick.

POLISHING MACHINE

POLISHING TUBING

The Plating & Polishing Device Manufacturing Company, of Philadelphia, Pa., has placed on the market a simple machine for grinding, polishing and buffing tubing and flat pieces, such as automobile bumpers. The machine is made up in two styles, horizontal and vertical, the illustration showing the method of operating.

The stand used for grinding, brushing and buffing iron or brass tubing or automobile bumpers vertically, can be operated by a boy with a little experience and does away with a man to hold the heavy piece at the wheel, wearing himself out with the weight of the work. The stand shown in the illustration is used for grinding, greasing, brushing and buffing horizontally. The grinding is done by putting the pressure necessary against the stand, and the tube is moved along with the hands, the stand carrying the weight. Buffing is done in the same manner as a man would do it holding up to the wheel, except that he puts the pressure on the stand by leaning against it and moving the tubing by the hands in the same manner as without the stand, and in like manner relieving the operator from the weight of the work. To make a first-class finish on tubing, perform one operation vertically and the next operation horizontally, and so on until the job has received the required amount of operation necessary.

Chromium Plating Developments

METAL AND THERMIT PROCESS

The Metal & Thermit Corporation, at 120 Broadway, New York City, after extensive research work during the past two or three years, has perfected and brought to a state of commercial development a process for chromium plating.

This process was originally invented by Professor George Grube, of Stuttgart, Germany; and the patent rights for this country were taken over by the Metal & Thermit Corporation early in 1923, while the Fried, Krupp A. G. has taken over the rights for Germany and other countries abroad.

The desirability of coating surfaces with metallic chromium has long been known. This metal, because of its unique combination of physical and chemical properties, is highly adaptable as a surface protecting medium on such base metals as iron, steel, brass, copper, German silver, lead, zinc, nickel, die cast metals, etc. It is a bluish white metal, which when polished has a bright, highly lustrous surface resembling platinum. It has a specific gravity when crystalline of 6.92 at 20° Centigrade. It is exceedingly hard and can be drilled only with great care and difficulty. In the Table of Relative Hardness of the Elements published by the Smithsonian Institute in their "Smithsonian Physical Tables," the diamond is assigned a hardness number of 10. The value for chromium is 9. The only other element of common occurrence which is listed as harder than chromium is boron, with a hardness number of 9.5. It compares very favorably with such materials as corundum (hardness number 9), topaz (8), flint (7), quartz (7) and garnet (7).

In addition to being so unusually hard, the metal is very resistant to corrosion in ordinary atmospheric conditions. Samples exposed to rain, sun, high humidity, sea atmosphere, etc., have stood up surprisingly well, maintaining their brightness and showing no signs of tarnishing. It is interesting to note that bright samples of chromium plate when exposed to atmospheric conditions, causing dirt, dust, grease and all sorts of foreign matter to collect, can be cleaned by simply washing with hot water and soap. No polishing is necessary, and water stains do not seem to produce any harmful effect on the surface.

Chemically, the metal is very interesting. It occurs in both an active and a passive state. When active it dissolves very readily in hydrochloric and hot sulphuric acids to give chromium salts. In the presence of strong oxidizing agents it tends to become passive. It is insoluble in nitric acid of all strengths, whether cold or boiling. Samples immersed in concentrated nitric acid and weighed before immersion, after boiling until acid had evaporated and dense brown fumes of NO_2 started to escape, on being re-weighed showed practically no loss in weight. One of the most convenient ways of making chromium active is to make it the cathode in an acid solution.

The difficulty heretofore has been to get a process which would be commercially feasible, both from an operating and a cost point of view. Small beaker experiments have been tried with varying degrees of success. There is, however, a long step between the beaker and the plating tank. To operate commercial sized tanks, holding hundreds of gallons of solution, day in and day out, maintaining these solutions to yield consistently good deposits of an adherent and uniform nature, turning out batch after batch of work with few or no failures, and doing all these things at a reasonable cost were the problems to be met before the process could be really practical for commercial use. It was with these basic considerations in view that the Metal & Thermit Corporation set out to develop a practical chromium plating process. This, it has now accomplished.

Deposits secured by means of this patented commercial process have shown properties in keeping with those enumerated above as characteristic of the element chromium. A five minute deposit of chromium was found to have the same resistance to buffing as a forty-five minute deposit of nickel made from a sulphate solution containing boric acid and maintained very carefully to the proper p^h concentration. Careful microscopic study of the grain size and structure of the deposits has shown them to be free from pinholes and pits and very uniform. Samples submitted to the salt spray test show that protection in this medium is very high.

The advantage of being able to plate this metal so rapidly is one of considerable importance to the man in the plant interested in production. The savings in floor space, tanks, solutions, labor, handling charges, etc., are quite evident. In cost the process compares very favorably, in view of the fact that although the metal is somewhat more expensive, much less is needed to give equal protection and this small amount can be put on in less time and with less space.

Numerous articles have been chromium plated with a high degree of success. These range from fine watch parts and jewelry as a substitute for platinum up to single surfaces 50 sq. ft. in area. It is interesting to note, as regards the latter statement, that a 50 sq. ft. copper base surface was plated with a deposit .001" thick, which was to resist highly corrosive organic acid solutions. This deposit had to be absolutely flawless or the material would find its way through any pinholes, etc., dissolve the copper and cause the chromium to blister and peel off. The surfaces so plated are in operation in one of the plants of a leading manufacturer and are standing up entirely satisfactorily, showing the deposit to be quite impervious.

The applications for chromium plating may best be judged by its properties. So great is the field and so numerous the posibilities that space does not permit of enumerating them all. It would suffice to say that chromium is suitable as a covering for any service where hardness, resistance to wear, resistance to corrosion, non-tarnishing, non-oxidizing qualities at high temperature and resistance to organic acids or nitric acid are required.

It is the intention of the Metal & Thermit Corporation to license this process to manufacturing concerns who are interested in obtaining the process for plating their various products. A number of concerns have already signed contracts.

CRODON

Dr. Colin G. Fink, head of the Division of Electro-Chemistry, Columbia University, New York, who developed the electrolytic method by which rare ancient bronzes, corroded beyond recognition, are now being restored to their original form, has, it is stated, with the help of his assistants and the research engineers of the Chemical Treatment Company, Inc., of New York, perfected, commercially, a process for chromium plating.

A factory for the production of chromium plate has been in operation for several months and thousands of steel, iron, brass and copper articles have been produced for commercial use. It is claimed that Crodon, the trade name by which this plate is called, will in thousands of cases afford the manufacturer an opportunity to discard the high-priced alloys which are so difficult to machine and permit him to fabricate his product of more easily worked metals, and in many cases to change from steel to brass or to copper, and still secure the necessary non-corrosive, hard and attractive surface qualities by applying a Crodon surface coating.

High temperature thermometer casings, golf club heads, plumbing fixtures, table ware, steam soot cleaner parts, marine hardware, high pressure steam valve seats, surgical instruments, turbine blades, acid proof containers, automobile parts and accessories, headlight reflectors, micrometers, dies and crusher-balls, are articles to which Crodon is recommended, and the variety of objects mentioned is but an indication of the extent of the field for chromium plate. For manufacturers of machinery of all kinds, the electrical field, railroads, farm implements and the metal trades in general, there are innumerable applications for chromium plate.

One example cited is that of a steel steam valve seat, plated with chromium and tested under 190 lbs. of superheated steam. It was first passed through aluminum sulphate crystals to give the

maximum corrosive effect and has withstood a test of 200 hours, part of the test being run with the valve practically closed to obtain the maximum wire-drawing effect without affecting the valve seat. This means that valves and seats can both be made of a steel having the same coefficient of expansion so that there will be no buckling in the valve seat as is sometimes the case when the seats are made of alloys.

It is stated Crodon is being used commercially for that portion of steam soot cleaner elements exposed to boiler gases and the direct impingement of the flames and is giving very satisfactory results in that there is no surface corrosion. A small test piece of steel pipe plated with less than one-half mill of chromium withstood a temperature of 2,000° F for twenty-four hours without affecting the plated surface in any way, although the inside of this pipe, also subjected to the flame gases, was corroded to such an extent that half its thickness was eaten away. There is a field also in lengthening the life of turbine blades and many other engine and pump parts and accessories which are now subject to excessive wear and corrosion.

Crodon plated copper strips have been repeatedly bent and twisted until the copper itself breaks, without any peeling or flaking of the plate. Where appearance is not a factor, Crodon plate is produced with a soft grey finish which is attractive, although entirely without brilliance. Chromium plated files have retained their sharp cutting teeth indefinitely while in stock in localities where ordinary files soon lost their value and had to be returned to the manufacturer. Chromium plated bearings of shafts and similar machine parts have resulted in a great saving in replacements. For hospitals, hotels, public buildings and in the home, chromium plate can be applied in innumerable ways. Plated building hardware, such as door knobs, door plates, hinges, etc., can now be furnished in a permanent brilliant or frosted silver-like finish particularly desirable in locations where the light is poor. The various silver-like finishes which can be secured with Crodon give it a very attractive appearance against a mahogany, cream or white background.

The rapid discoloration of silver when brought into contact with food such as eggs, onions, lemon juice, etc., often resulting in deep black stains so difficult to remove, is said to be entirely foreign to Crodon plate.

The Chemical Treatment Company, to which the patents pending have been assigned, plans to continue the production of Crodon by enlarging its present plant capacity and erecting additional plants at central locations. At a later date the company may be willing to license the process to manufacturers who will need chrome plating in quantities.

LARGE PICKLING TANK

It is not often it takes a whole flat car, and a special one at that, to transport one single tank from maker to user, but, as the accompanying illustration will indicate, that is exactly what happened to a recent order filled by the Kalamazoo Tank & Silo Company, of Kalamazoo, Mich.

The tank is a pickling tank for the Champion Spark Plug Company, of Toledo, Ohio, and contrary to usual practice was shipped set-up. As the tank is 43 ft. long, 7 ft. 4 in. wide and 4 ft. 4 in. deep, the common "garden variety" of flat car would not do, and it was only with difficulty that a large enough one could be secured, a 61-footer finally being located.

Not often, in the 58 years of tank manufacture by its makers, has a larger rectangular tank been built, as the timbers of this one are of 8-in. stock, the usual tank being four to six. This big fellow weighed eight and a half tons, and was made of yellow pine, 90% heart stock.

A feature of the tank is its unusual rodding and bracing, all metal being outside the timber rather than through them. The tank is to contain sulphuric acid, and construction of this sort eliminates the more expensive acid-resisting metals. Should corrosion necessitate new rods, it is pointed out that new ones are readily installed, without taking the tank out of use during the change. One firm who formerly found its pickling tanks lasted three

LARGE PICKLING TANK

to four years, have more than tripled its tank life with this design.

Large tanks are by no means unusual with Kalamazoo Tank & Silo Company, a recent order having been filled for eight round tanks of 8-in. stock, 24 ft. in diameter, with 32-ft. staves.

EQUIPMENT AND SUPPLY CATALOGS

Grinding Equipment. Hardings Company, New York.

Keystone Buffing Wheels. Walter C. Gold, Philadelphia, Pa.

Special Stampings. Detroit Stamping Company, Detroit, Mich.

Drying Equipment. Ruggles-Coles Engineering Company, York, Pa.

Restaurant Ventilation. American Blower Company, Detroit, Mich.

Buffing Compositions. Crown Rheostat & Supply Company, Chicago, Ill.

Automatic Arc Welding. General Electric Company, Schenectady, N. Y.

Portable Carbide Lights. Alexander Milburn Company, Baltimore, Md.

Safety Ladder Shoes. U. S. Safety Appliance Corporation, Cleveland, Ohio.

Chase Brass. A booklet of cartoons. Chase Metal Works, Waterbury, Conn.

Automobile Refinishing. DeVilbiss Manufacturing Company, Toledo, Ohio.

Welding and Cutting Apparatus. Alexander Milburn Company, Baltimore, Md.

Copper Yesterday and Today. Copper and Brass Research Association, New York.

Half Inch Universal Electric Drill. Hisey-Wolf Machine Company, Cincinnati, Ohio.

Tructors—Tractors and Trucks. Elwell-Parker Electric Company,, Cleveland, Ohio.

Metal Statistics, Year Book for 1924. American Bureau of Metal Statistics, New York.

Industrial Research. A list of publications by members of Mellon Institute, Pittsburgh, Pa.

Engineering Foundation. Report for the year ended February 11, 1925. Publication No. 10.

Baseball Schedules. Major league schedules distributed by Hilo Varnish Company, Pittsburgh, Pa.

Special Alloys and Hardeners. Numerous pamphlets from Niagara Falls Smelting & Refining Corporation, Buffalo, N. Y.

Ledrite Rod-O-Graph. A new edition of the chart for figuring brass rod weights. Bridgeport Brass Company, Bridgeport, Conn.

Belt and Motor Driven Ball Bearing Grinders, Polishing Machines and Swing Frame Grinders. Builders Iron Foundry, Providence, R. I.

Methods of Compensation. Booklet No. 2. Analysis of Branch Managers' Contracts. Metropolitan Life Insurance Company, New York.

University Bulletin. Announcement of the Program in Chemical Engineering and of the Graduate Courses, University of Michigan, Ann Arbor, Mich.

ASSOCIATIONS and SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

AMERICAN FOUNDRYMEN'S ASSOCIATION

HEADQUARTERS, 140 S. DEARBORN STREET, CHICAGO, ILL.

SPECIAL DISCUSSION SESSION FOR BRASS FOUNDRY

A new departure in American Foundrymen's Association convention features, for the Syracuse meeting, will be the holding of round-table discussions on brass foundry problems. All the brass foundry foremen and superintendents are invited to attend the luncheon gathering to be held Tuesday noon, October 6, 1925.

After the luncheon an informal discussion of shop problems will be in order. No prepared papers will be read, but short discussions will be called for by the chairman.

The program committee realizes that some of the past meetings on brass foundry topics have been of little interest to practical brass foundrymen, because the subjects discussed were mostly devoted to the metallurgical phase of the industry. As the meeting is planned, the practical brass foundryman will have a chance to air his views on topics close to the shop man's interest.

TESTING MATERIALS SOCIETY

HEADQUARTERS, 1315 SPRUCE STREET, PHILADELPHIA, PA.

The twenty-eighth annual meeting of the American Society for Testing Materials will be held at the Chalfonte-Haddon Hall, Atlantic City, N. J., June 22-26, 1925. Papers relating on the program to metals are as follows:

Corrosion.—This subject again comes to the front in our program. Committee A-5 will announce a comprehensive series of tests of metallic-coated products, and Committees B-3 and D-14 will also report on corrosion tests. A paper on corrosion tests of electrical conductors is a feature.

Metals at High Temperatures.—There will be several papers on this important subject.

Other features of interest are papers on fatigue of metals and specifications for copper and bronze trolley wire.

Announcement is made of the following nominations for officers as submitted by the Nominating Committee:

President: W. H. FULWEILER, Chemical Engineer, United Gas Improvement Company, Philadelphia, Pa.

Vice-President: H. F. Moore, Professor of Engineering Materials, University of Illinois, Urbana, Ill.

Members of Executive Committee: LOUIS ANDERSON, JR., Chemical Engineer and Chief Chemist, Alpha Portland Cement Co., Easton, Pa.

E. F. KENNEY, Metallurgical Engineer, Bethlehem Steel Co., Inc., Bethlehem, Pa.

T. D. LYNCH, Manager, Materials and Process Engineering Department, Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa.

K. D. MACKENZIE, Consulting Chemist, The Texas Co., 17 Battery Place, New York City.

NEW ENGLAND FOUNDRYMEN

HEADQUARTERS, EXCHANGE CLUB, BOSTON, MASS.

At the May meeting of the New England Foundrymen's Association on Wednesday evening, May 13, at the Exchange Club, Boston, Mass., the association devoted the evening to the operation of brass and aluminum foundries. R. F. Harrington, Hunt-Spiller Manufacturing Corporation, Boston, presided, and C. F. Lundbom, general foundry superintendent Walworth Manufacturing Company, led the discussion.

F. H. Cole, metallurgist Walworth Manufacturing Company, Boston, gave a history of the making of brass. In the ensuing discussion that followed many ideas on gating and other phases of foundry practice were advanced. Edward J. Rogers, C. E. Rogers Brass Foundry, Boston, then gave a history of aluminum from the ore to the pig, and some points on the melting and pouring of aluminum castings. E. B. Estabrook, Leeds-Northrup Company, Philadelphia, gave a talk on pyrometric control in the melting and casting of non-ferrous and ferrous metals, illustrated by lantern slides.

PHILADELPHIA FOUNDRYMEN

HEADQUARTERS, CARE OF HOWARD EVANS, UNION LEAGUE, PHILADELPHIA, PA.

The 346th dinner and meeting were held at the Manufacturers' Club, May 12, 1925. The meeting was addressed by William Kuebler, Chief Chemist of the South Philadelphia Works of the Westinghouse Electric and Manufacturing Company, who augmented his talk with over 100 lantern slides. The South Philadelphia foundry, which has a capacity of approximately 2,500,000 lbs. of iron and 100,000 lbs. of brass and bronze per month, was visited by means of a mythical aeroplane trip from the roof of the Manufacturers' Club to the plant, the first slide shown being an aeroplane view of the plant.

The foundry is 600 ft. long and 180 ft. wide, served by 1-100 ton, 2-60 ton, 2-30 ton, 5-10 ton and 6-5 ton cranes. Two 40 ton and one 15 ton air furnaces, one cupola lined to 60 inches and two cupolas lined to 66 inches, constitute the melting equipment.

Sand is stored in moisture and frost proof bins of 10,000 tons capacity and is conveyed to foundry through underground tunnels. Methods of molding 70,000 sq. ft. condenser shell sections were shown. These condenser shell sections when completely assembled contain 12,734 1 inch round brass tubes each 21 ft. 3 inches long, or a total of 51.17 miles of tubing in each condenser.

The brass foundry was visited through the medium of the slides and castings weighing from ¼ to 1,500 lbs. were shown. The work in the brass foundry is highly specialized and is under strict metallurgical and chemical control. Temperatures are taken on every heat and all castings are poured at a definite temperature. The pyrometer is used in the iron foundry as well.

The plant layout was described, showing the movement of an order from the pattern shop to the electing and testing shop, the movement being all in one direction, thus tending to increase production. The sanitary facilities for foundry employees were shown, after which the members were shown through the machine shops.

AMERICAN ZINC INSTITUTE

HEADQUARTERS, 27 CEDAR STREET, NEW YORK

A. P. Cobb, vice-president of the New Jersey Zinc Company, was elected president of the American Zinc Institute at the final session of its two-day convention at the Hotel Statler, St. Louis, Mo., April 30, 1925.

A. E. Bendelari, vice-president of the Eagle Picher Lead Company, was elected first vice-president; Jesse G. Starr, of the Quinton Spelter Company, Joplin, Mo., second vice-president; John A. McCarthy, of the Anaconda Copper Mining Company, New York, third vice-president; Howard I. Young, of the American Zinc Lead Company, Mascot, Tenn., was re-elected treasurer, and Stephen T. Tuthill, of New York, was elected to his fifth term as secretary.

AMERICAN ELECTROCHEMICAL SOCIETY

HEADQUARTERS, COLUMBIA UNIVERSITY, NEW YORK

With a total registration of 320, the Niagara Falls meeting was one of the largest ever held by the society. The ballroom of Hotel Niagara was well filled on Thursday morning, April 23, when President Parmelee called the meeting to order and the chair was turned over to William G. Harvey, who had charge of the symposium on "Fused Electrolytes." Seven papers were presented at this session and brought forth lively discussion. The papers describing the Aluminum Company of America's new process for obtaining pure aluminum were of especial interest. The symposium was continued in the afternoon session.

A certificate of honorary membership was presented to Dr. Wilder D. Bancroft, of Cornell University.

At the annual business meeting of the society, held on Friday morning, the report of the tellers of election was read and the president announced the election of the following new officers:

President: Frederick M. Becket.

Vice-presidents: William Blum, F. C. Frary and E. F. Cone.

Managers: H. W. Gillett, F. N. Speller and J. Watson Bain.

Treasurer: Acheson Smith.
Secretary: Colin G. Fink.

The Saturday morning session was devoted to papers on "Electrodeposition." Six papers were presented on this subject and valuable discussion brought forth. At 1 o'clock President Parmelee declared the forty-seventh meeting of the society adjourned.

The following officers have been elected by the members of the Electrothermic and Electrodeposition Divisions:

ELECTROTHERMIC DIVISION

Chairman: H. M. Williams.
Vice-chairman: H. W. Gillett.
Secretary-treasurer: Lyman C. Judson.
Members-at-large: A. L. Feild, E. L. Crosby and Paul J. Kruesi.

ELECTRODEPOSITION DIVISION

Chairman: S. Skowronski.
Vice-chairman: F. C. Mathers.
Secretary: William Blum.
Members-at-large: W. M. Phillips and O. J. Sizelove.
Foreign representatives: W. E. Hughes, A. H. W. Aten and Bertram Wood.

NEW YORK BRANCH, A. E. S.

HEADQUARTERS, CARE OF J. E. STERLING, 468 GRAND AVENUE, LONG ISLAND CITY, NEW YORK

President W. Fischer presided at the April meetings of the New York Branch. The application of George Dubpernell was received and referred to the Board of Trustees.

Edgar L. Tannert, of the New York Branch, read an interesting paper in which he outlined practical methods in gold plating and coloring both cheap and expensive jewelry. Frank Townsend, of New Haven, Conn., also read a very interesting paper in which he gave a detailed account of tripoli, lime and rouge compositions.

Discussions on both papers followed, after which a vote of thanks was tendered to Mr. Tannert and Mr. Townsend for their excellent papers.

President Wm. Fischer presided at the May meetings. The meetings which were exceptionally well attended were devoted to the nomination and election of officers for the ensuing year. Delegates and Alternates for the coming Montreal Convention were also elected. The following are the officers elected: President, Wm. Fischer; Vice-President, F. Houshalter; Secretary-Treasurer, John E. Sterling; Recording Secretary, E. Tannert; Librarian, Philip Morningstar; Sergeant-at-Arms, B. Nadel; Assistant Sergeant-at-Arms, H. Ruhlmann; Trustees, T. Haddow, Franklyn J. MacStocker, Jos. Minges. Delegates to Montreal Convention: Wm. Fischer, John E. Sterling, Franklyn J. MacStocker. Alternates: Philip Morningstar, Jos. Downs, F. Houshalter.

The application of G. Simmon was received and referred to the Board of Trustees. T. A. Gardner read a paper on preparing and plating aluminum die castings. An enthusiastic discussion followed. A vote of thanks was tendered to Mr. Gardner for his interesting paper.

AMERICAN GAS ASSOCIATION

HEADQUARTERS, 342 MADISON AVENUE, NEW YORK

The establishment of a national research organization to make gas available to all industrial fuel users was the proposal made May 21, 1925, at the annual spring conference of the American Gas Association in Atlantic City, N. J., by Charles A. Munroe, chairman of the board of the Laclede Gas Light Company of St. Louis and a former president of the association.

As outlined by Mr. Munroe, the objects of the new organization, to be underwritten by the manufactured gas companies of the country, would be to develop efficient gas-burning equipment for all fuel users in industry and enable the gas companies to meet the demand for gas fuel wherever heat is required.

It is understood that Mr. Munroe has the support of other leading public utility executives for his project, and that leaders of the gas industry are studying its details with the greatest interest.

"The present tendency to conserve our national resources, especially oil and natural gas, makes it inevitable that the manufactured gas industry will have to shoulder the heating burdens of the country," he said. "The gas industry is now equipped to supply all the immediate fuel requirements for industry, millions of dollars having been spent for improvements and new construction during the past two years.

"Although 25 per cent of the present output of manufactured gas in this country is being used in industry, the majority of industrial fuel users are still either employing wasteful and outworn methods of combustion, or have been forced to turn to electricity, a power producer."

Mr. Munroe proposed that a fund be provided to finance an organization to carry on research along these lines over a period of five years. He stated that there are companies now engaged in manufacturing industrial appliances who could undertake this work and carry it to a successful conclusion.

CHEMICAL EQUIPMENT MANUFACTURERS

HEADQUARTERS, 1328 BROADWAY, NEW YORK

"Welding to Order" will be one of the features of the Chemical Equipment Exposition, State Armory, Providence, R. I., June 22-27, 1925.

The Association of Chemical Equipment Manufacturers has invited some 15,000 technical and industrial men throughout the country, representing the entire range of chemical and chemically-dependent industries, and that one of its Providence exhibitors is prepared to demonstrate the adaptation of a certain type of welding and cutting to a wide range of metals "to order" at Exposition visitors' requests. The particular field of welding and cutting processes to be covered by the demonstrations is that of special corrosion-resistant alloys. The demonstrations will, in so far as possible, indicate the application of these processes to such alloys on a commercial scale.

All that is necessary to insure a particular demonstration, according to the association, is that its office, 1328 Broadway, be informed, some days prior to the show, of the particular alloy in which any intended visitor is interested.

WASTE MATERIAL DEALERS

HEADQUARTERS, TIMES BUILDING, NEW YORK

A meeting of the Metal Division of the National Association of Waste Material Dealers was held at the Congress Hotel, Chicago, on Wednesday, June 10, 1925, at 2 P. M. At this meeting a report was made covering the proposed changes in the Metal Classification, which changes were considered by a large and representative committee at a meeting held at association headquarters on May, 1925.

PLATING SUPPLY SALESMEN

HEADQUARTERS, CARE OF JOHN C. OBERENDER, 185 CHURCH ST., NEW HAVEN, CONN.

The last call has been issued for a mass meeting of all those interested in the selling of products to the plating craft to meet at the Mt. Royal Hotel, Montreal, for dinner at 6 o'clock on the night preceding the opening of the annual convention of the A. E. S., June 28, 1925.

No further notice will be given, but all those interested in this movement and expecting to attend are requested to advise either Wilfred S. McKeon, temporary chairman, Liquid Sulphur Building, Greensburg, Pa., or John C. Oberender, temporary secretary, c/o The Zapon Company, 185 Church street, New Haven, Conn.

CANTON EXPOSITION

HEADQUARTERS, CARE OF CANTON CHAMBER OF COMMERCE, NEW VICARY BUILDING, CANTON, OHIO

One of the most interesting exhibits on display at the eight-day Exposition of Progress which closed recently at Canton, Ohio, was that of the United Metal Products Company, according to advices from that city. The event, held in tented quarters because of its great size, was sponsored by the Canton Chamber of Commerce. Practically every phase of business, industrial and civic life of the community was represented by the exhibits, numbering more than two hundred. Conservatively estimated the total attendance mounted to 60,000 persons.

The United Metal Products Company display gave visitors at the Exposition an idea of the latest metal products used in construction of modern fireproof structures throughout the country.

ASSOCIATIONS and SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

AMERICAN FOUNDRYMEN'S ASSOCIATION

HEADQUARTERS, 140 S. DEARBORN STREET, CHICAGO, ILL.

SPECIAL DISCUSSION SESSION FOR BRASS FOUNDRY

A new departure in American Foundrymen's Association convention features, for the Syracuse meeting, will be the holding of round-table discussions on brass foundry problems. All the brass foundry foremen and superintendents are invited to attend the luncheon gathering to be held Tuesday noon, October 6, 1925.

After the luncheon an informal discussion of shop problems will be in order. No prepared papers will be read, but short discussions will be called for by the chairman.

The program committee realizes that some of the past meetings on brass foundry topics have been of little interest to practical brass foundrymen, because the subjects discussed were mostly devoted to the metallurgical phase of the industry. As the meeting is planned, the practical brass foundryman will have a chance to air his views on topics close to the shop man's interest.

TESTING MATERIALS SOCIETY

HEADQUARTERS, 1315 SPRUCE STREET, PHILADELPHIA, PA.

The twenty-eighth annual meeting of the American Society for Testing Materials will be held at the Chalfonte-Haddon Hall, Atlantic City, N. J., June 22-26, 1925. Papers relating on the program to metals are as follows:

Corrosion.—This subject again comes to the front in our program. Committee A-5 will announce a comprehensive series of tests of metallic-coated products, and Committees B-3 and D-14 will also report on corrosion tests. A paper on corrosion tests of electrical conductors is a feature.

Metals at High Temperatures.—There will be several papers on this important subject.

Other features of interest are papers on fatigue of metals and specifications for copper and bronze trolley wire.

Announcement is made of the following nominations for officers as submitted by the Nominating Committee:

President: W. H. FULWEILER, Chemical Engineer, United Gas Improvement Company, Philadelphia, Pa.

Vice-President: H. F. Moore, Professor of Engineering Materials, University of Illinois, Urbana, Ill.

Members of Executive Committee: LOUIS ANDERSON, JR., Chemical Engineer and Chief Chemist, Alpha Portland Cement Co., Easton, Pa.

E. F. KENNEY, Metallurgical Engineer, Bethlehem Steel Co., Inc., Bethlehem, Pa.

T. D. LYNCH, Manager, Materials and Process Engineering Department, Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa.

K. D. MACKENZIE, Consulting Chemist, The Texas Co., 17 Battery Place, New York City.

NEW ENGLAND FOUNDRYMEN

HEADQUARTERS, EXCHANGE CLUB, BOSTON, MASS.

At the May meeting of the New England Foundrymen's Association on Wednesday evening, May 13, at the Exchange Club, Boston, Mass., the association devoted the evening to the operation of brass and aluminum foundries. R. F. Harrington, Hunt-Spiller Manufacturing Corporation, Boston, presided, and C. F. Lundbom, general foundry superintendent Walworth Manufacturing Company, led the discussion.

F. H. Cole, metallurgist Walworth Manufacturing Company, Boston, gave a history of the making of brass. In the ensuing discussion that followed many ideas on gating and other phases of foundry practice were advanced. Edward J. Rogers, C. E. Rogers Brass Foundry, Boston, then gave a history of aluminum from the ore to the pig, and some points on the melting and pouring of aluminum castings. E. B. Estabrook, Leeds-Northrup Company, Philadelphia, gave a talk on pyrometric control in the melting and casting of non-ferrous and ferrous metals, illustrated by lantern slides.

PHILADELPHIA FOUNDRYMEN

HEADQUARTERS, CARE OF HOWARD EVANS, UNION LEAGUE, PHILADELPHIA, PA.

The 346th dinner and meeting were held at the Manufacturers' Club, May 12, 1925. The meeting was addressed by William Kuebler, Chief Chemist of the South Philadelphia Works of the Westinghouse Electric and Manufacturing Company, who augmented his talk with over 100 lantern slides. The South Philadelphia foundry, which has a capacity of approximately 2,500,000 lbs. of iron and 100,000 lbs. of brass and bronze per month, was visited by means of a mythical aeroplane trip from the roof of the Manufacturers' Club to the plant, the first slide shown being an aeroplane view of the plant.

The foundry is 600 ft. long and 180 ft. wide, served by 1-100 ton, 2-60 ton, 2-30 ton, 5-10 ton and 6-5 ton cranes. Two 40 ton and one 15 ton air furnaces, one cupola lined to 60 inches and two cupolas lined to 66 inches, constitute the melting equipment.

Sand is stored in moisture and frost proof bins of 10,000 tons capacity and is conveyed to foundry through underground tunnels. Methods of molding 70,000 sq. ft. condenser shell sections were shown. These condenser shell sections when completely assembled contain 12,734 1 inch round brass tubes each 21 ft. 3 inches long, or a total of 51.17 miles of tubing in each condenser.

The brass foundry was visited through the medium of the slides and castings weighing from ¼ to 1,500 lbs. were shown. The work in the brass foundry is highly specialized and is under strict metallurgical and chemical control. Temperatures are taken on every heat and all castings are poured at a definite temperature. The pyrometer is used in the iron foundry as well.

The plant layout was described, showing the movement of an order from the pattern shop to the electing and testing shop, the movement being all in one direction, thus tending to increase production. The sanitary facilities for foundry employees were shown, after which the members were shown through the machine shops.

AMERICAN ZINC INSTITUTE

HEADQUARTERS, 27 CEDAR STREET, NEW YORK

A. P. Cobb, vice-president of the New Jersey Zinc Company, was elected president of the American Zinc Institute at the final session of its two-day convention at the Hotel Statler, St. Louis, Mo., April 30, 1925.

A. E. Bendelari, vice-president of the Eagle Picher Lead Company, was elected first vice-president; Jesse G. Starr, of the Quinton Spelter Company, Joplin, Mo., second vice-president; John A. McCarthy, of the Anaconda Copper Mining Company, New York, third vice-president; Howard I. Young, of the American Zinc Lead Company, Mascot, Tenn., was re-elected treasurer, and Stephen T. Tuthill, of New York, was elected to his fifth term as secretary.

AMERICAN ELECTROCHEMICAL SOCIETY

HEADQUARTERS, COLUMBIA UNIVERSITY, NEW YORK

With a total registration of 320, the Niagara Falls meeting was one of the largest ever held by the society. The ballroom of Hotel Niagara was well filled on Thursday morning, April 23, when President Parmelee called the meeting to order and the chair was turned over to William G. Harvey, who had charge of the symposium on "Fused Electrolytes." Seven papers were presented at this session and brought forth lively discussion. The papers describing the Aluminum Company of America's new process for obtaining pure aluminum were of especial interest. The symposium was continued in the afternoon session.

A certificate of honorary membership was presented to Dr. Wilder D. Bancroft, of Cornell University.

At the annual business meeting of the society, held on Friday morning, the report of the tellers of election was read and the president announced the election of the following new officers:

President: Frederick M. Becket.

Vice-presidents: William Blum, F. C. Frary and E. F. Cone.

Managers: H. W. Gillett, F. N. Speller and J. Watson Bain.

Treasurer: Acheson Smith.
Secretary: Colin G. Fink.

The Saturday morning session was devoted to papers on "Electrodeposition." Six papers were presented on this subject and valuable discussion brought forth. At 1 o'clock President Parmelee declared the forty-seventh meeting of the society adjourned.

The following officers have been elected by the members of the Electrothermic and Electrodeposition Divisions:

ELECTROTHERMIC DIVISION

Chairman: H. M. Williams.
Vice-chairman: H. W. Gillett.
Secretary-treasurer: Lyman C. Judson.
Members-at-large: A. L. Feild, E. L. Crosby and Paul J. Kruesi.

ELECTRODEPOSITION DIVISION

Chairman: S. Skowronski.
Vice-chairman: F. C. Mathers.
Secretary: William Blum.
Members-at-large: W. M. Phillips and O. J. Sizelove.
Foreign representatives: W. E. Hughes, A. H. W. Aten and Bertram Wood.

NEW YORK BRANCH, A. E. S.

HEADQUARTERS, CARE OF J. E. STERLING, 468 GRAND AVENUE, LONG ISLAND CITY, NEW YORK

President W. Fischer presided at the April meetings of the New York Branch. The application of George Dubpernell was received and referred to the Board of Trustees.

Edgar L. Tannert, of the New York Branch, read an interesting paper in which he outlined practical methods in gold plating and coloring both cheap and expensive jewelry. Frank Townsend, of New Haven, Conn., also read a very interesting paper in which he gave a detailed account of tripoli, lime and rouge compositions.

Discussions on both papers followed, after which a vote of thanks was tendered to Mr. Tannert and Mr. Townsend for their excellent papers.

President Wm. Fischer presided at the May meetings. The meetings which were exceptionally well attended were devoted to the nomination and election of officers for the ensuing year. Delegates and Alternates for the coming Montreal Convention were also elected. The following are the officers elected: President, Wm. Fischer; Vice-President, F. Houshalter; Secretary-Treasurer, John E. Sterling; Recording Secretary, E. Tannert; Librarian, Philip Morningstar; Sergeant-at-Arms, B. Nadel; Assistant Sergeant-at-Arms, H. Ruhlmann; Trustees, T. Haddow, Franklyn J. MacStocker, Jos. Minges. Delegates to Montreal Convention: Wm. Fischer, John E. Sterling, Franklyn J. MacStocker. Alternates: Philip Morningstar, Jos. Downs, F. Houshalter.

The application of G. Simmon was received and referred to the Board of Trustees. T. A. Gardner read a paper on preparing and plating aluminum die castings. An enthusiastic discussion followed. A vote of thanks was tendered to Mr. Gardner for his interesting paper.

AMERICAN GAS ASSOCIATION

HEADQUARTERS, 342 MADISON AVENUE, NEW YORK

The establishment of a national research organization to make gas available to all industrial fuel users was the proposal made May 21, 1925, at the annual spring conference of the American Gas Association in Atlantic City, N. J., by Charles A. Munroe, chairman of the board of the Laclede Gas Light Company of St. Louis and a former president of the association.

As outlined by Mr. Munroe, the objects of the new organization, to be underwritten by the manufactured gas companies of the country, would be to develop efficient gas-burning equipment for all fuel users in industry and enable the gas companies to meet the demand for gas fuel wherever heat is required.

It is understood that Mr. Munroe has the support of other leading public utility executives for his project, and that leaders of the gas industry are studying its details with the greatest interest.

"The present tendency to conserve our national resources, especially oil and natural gas, makes it inevitable that the manufactured gas industry will have to shoulder the heating burdens of the country," he said. "The gas industry is now equipped to supply all the immediate fuel requirements for industry, millions of dollars having been spent for improvements and new construction during the past two years.

"Although 25 per cent of the present output of manufactured gas in this country is being used in industry, the majority of industrial fuel users are still either employing wasteful and outworn methods of combustion, or have been forced to turn to electricity, a power producer."

Mr. Munroe proposed that a fund be provided to finance an organization to carry on research along these lines over a period of five years. He stated that there are companies now engaged in manufacturing industrial appliances who could undertake this work and carry it to a successful conclusion.

CHEMICAL EQUIPMENT MANUFACTURERS

HEADQUARTERS, 1328 BROADWAY, NEW YORK

"Welding to Order" will be one of the features of the Chemical Equipment Exposition, State Armory, Providence, R. I., June 22-27, 1925.

The Association of Chemical Equipment Manufacturers has invited some 15,000 technical and industrial men throughout the country, representing the entire range of chemical and chemically-dependent industries, and that one of its Providence exhibitors is prepared to demonstrate the adaptation of a certain type of welding and cutting to a wide range of metals "to order" at Exposition visitors' requests. The particular field of welding and cutting processes to be covered by the demonstrations is that of special corrosion-resistant alloys. The demonstrations will, in so far as possible, indicate the application of these processes to such alloys on a commercial scale.

All that is necessary to insure a particular demonstration, according to the association, is that its office, 1328 Broadway, be informed, some days prior to the show, of the particular alloy in which any intended visitor is interested.

WASTE MATERIAL DEALERS

HEADQUARTERS, TIMES BUILDING, NEW YORK

A meeting of the Metal Division of the National Association of Waste Material Dealers was held at the Congress Hotel, Chicago, on Wednesday, June 10, 1925, at 2 P. M. At this meeting a report was made covering the proposed changes in the Metal Classification, which changes were considered by a large and representative committee at a meeting held at association headquarters on May, 1925.

PLATING SUPPLY SALESMEN

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One of the most interesting exhibits on display at the eight-day Exposition of Progress which closed recently at Canton, Ohio, was that of the United Metal Products Company, according to advices from that city. The event, held in tented quarters because of its great size, was sponsored by the Canton Chamber of Commerce. Practically every phase of business, industrial and civic life of the community was represented by the exhibits, numbering more than two hundred. Conservatively estimated the total attendance mounted to 60,000 persons.

The United Metal Products Company display gave visitors at the Exposition an idea of the latest metal products used in construction of modern fireproof structures throughout the country.

The company manufactures hollow metal doors, architectural trim, patented conduo-base, partitions, drawn and roller moulding and other metal products. While the company provides 46 standard finishes for its metal doors and other interior trimmings, a special department of the plant serves to match perfectly any particular wood finish, when samples are submitted with an order.

Among the other well-known exhibitors at the Exposition were the Timken Roller Bearing Company, the Hoover Suction Sweeper Company, the Diebold Safe and Lock Company and the Arctic Ice Machine Company, all users of metals.

SOUTHERN EXPOSITION

HEADQUARTERS, GRAND CENTRAL PALACE, NEW YORK

The Southern Exposition was held in New York, May 11-23, 1925, at Grand Central Palace. It showed the advancement made by the southern states in agriculture, horticulture, mining, manufacturing and commerce.

The South stands out pre-eminently as a producer of raw materials. Almost all of the bauxite for the manufacture of aluminum comes from Georgia and Arkansas. However, manufacturing is growing. An aluminum fabricating plant is located in Alcoa, Tenn., and the exhibit of the Dixie Metal Products Sales Company, Inc., of Birmingham, Ala., showed interesting metal products and metal finishes. Copper working is carried on to considerable extent in Louisville, Ky., and a large number of brass foundries and metal plants like that of the Ajax Metal Company, Birmingham, Ala.. are located in the South.

BIRMINGHAM BRASS FOUNDERS'

HEADQUARTERS, BIRMINGHAM, ENGLAND

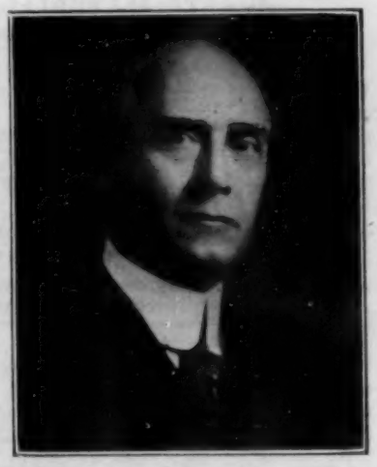
An important branch of the Birmingham Brassfounders' Association is the Extended Uses Council, formed by two or three kindred associations. Its object is to find new uses for copper and kindred alloys, and very useful service is being rendered in promoting the change-over from lead pipe to copper tube for water conveyance. This revolution is extending, several firms having introduced special down spouts and gutterings with suitable fittings. For a variety of purposes, gun metal is being preferred to copper, and phosphor bronze is also increasingly used, especially for motor gear work, the bushings being of this material; while it is generally preferred for aerial motors. Certain parts are now generally of phosphor bronze, in the building of motor engines. One large firm is doing a big business with Scandinavia, in the supply of white metal in the form of plain sheets for making up into beaten pewter, for high-class ornamental ware, such as candlesticks, fruit vases, flower epergnes, etc.

Personals

W. L. D. BEDELL

W. L. D. Bedell, secretary of The Hanson & Van Winkle Company, Newark, N. J., retired February 11, 1925.

Mr. Bedell was connected with that company for a term of nearly 38 years, beginning in 1887 and holding for a number of years each of the following positions: Shipping Clerk, General Factory Superintendent, General Correspondent and Office Salesman. He was elected Secretary of the company in 1911, which office he has held for the past 14 years until the time of his retirement. He also served as Secretary of The Canadian Hanson & Van Winkle Co., Limited, of Toronto, Canada, for 13 years, from the time of its incorporation in 1911 until July 1924.



W. L. D. BEDELL

Mr. Bedell has an excellent reputation, has always been very active in the industry and is known from coast to coast. He has a large acquaintance in the trade and has made many friends during his business activities. He is the author of "Practical Electroplating." The first edition of this book appeared in 1909, the demand and great sale of which warranted the production of the revised and very much enlarged fifth edition of 1923.

Mr. Bedell also originated a number of very useful articles for the plating and polishing industry, which are recognized as standard.

Herbert W. Coe, works manager of the American Brass Company, Waterbury, Conn. has been elected president of the Ansonia Clock Company, Brooklyn, N. Y.

Lawrence R. Clapp has become vice-president of the New Haven Copper Company, Seymour, Conn. He was formerly manager of the Allenby Copper Company, Ltd., Allenby, B. C., Canada.

R. L. McMillan, formerly with the Bennett-O'Connell Company, is now representing E. Reed Burns & Sons Inc., of Chicago, Ill., in Chicago and vicinity.

Royal F. Clark has resigned his position at the Sheldon Axle & Spring Company, Wilkes-Barre, Pa., and is now in charge of the plating department of the Langenau Manufacturing Company, Cleveland, Ohio, manufacturers of trunk and casket hardware.

F. C. Morrison has formed an organization under the name of General Die Casting Company, Reading, Pa., for the production of quality die cast parts. He was manager of the die casting division of the Light Manufacturing & Foundry Company, Pottstown, Pa., for twelve years.

T. G. Meachem has purchased an interest in the Greasalt Products Corporation, New York City, and has been elected vice-president. Mr. Meachem will have entire charge of sales, making his headquarters at the Syracuse office in the Seitz Building. He was formerly associated with the Meachem Gear Corporation.

Dr. H. Foster Bain, director, Bureau of Mines, Washington, D. C., has resigned and on July 1 will become secretary of the American Institute of Mining and Metallurgical Engineers, New York, of which the Institute of Metals is a Division. Dr. F. F. Sharpless, the retiring secretary, will resume his interests in mining but will devote a large part of his time to the Institute.

R. G. Hutchinson, consulting and process engineer has severed his connection with the Bridgeport Brass Company, effective June 1, 1925. Mr. Hutchinson was with The American Brass Company for eighteen years, specializing in plant and departmental layouts, processes, handling equipment and organization. From 1917 to 1921 he was plant superintendent of The Buffalo Branch of The American Brass Company.

Daniel H. Meloche of the Holley Carburetor Company, Detroit, Mich., has been signally honored by the Franklin Institute, Philadelphia, which has awarded him the Edward Longstreth medal for his invention embodied in long life moulds. Mr. Meloche perfected a commercial process for pouring molten metal into metal moulds. The Holley Carburetor Company has made more than 2,000,000 carburetor castings in the last two years in these long-life moulds. The process is also leased. In addition to the machines in use in their plants, others are in operation at the River Rouge plant of the Ford Motor company, the Harrison Radiator corporation, Lockport, N. Y. and the plant of Ludwig Loewe & Company, Berlin, Germany—a firm which recently acquired the German rights for the process. More than 40,000 castings have been made from a single mould without replacement by this process. The basis of the new process is the provision for a heat barrier between the mold and casting. The mold is thinly covered with a patented coating which checks the heat flow sufficiently to prevent the formation of chilled iron. This coating is further protected with a thick coating of lamp black, and the carbon in the form of lamp

black by uniting with the skin of the casting, lowers its melting point and thereby retards the cooling rate of the casting. Aluminum and brass have been poured into these moulds and Mr. Meloche states that from experiments he has made, that the machinery and processes he has evolved are adaptable to metal as well as grey iron castings.

Obituaries

WALTER PIERCE FRENCH

Walter Pierce French, of E. J. Lavino & Company, whose death was noted in our May, 1925, issue, was born in Philadelphia, August 26, 1875, and was educated in the public schools of Philadelphia. He was first employed in his father's grocery store as errand boy, then served as stockboy in a department store. After a short time he entered an insurance company office and later took a position in one of Philadelphia's banks, which subsequently merged with the Girard National Bank. There he remained eighteen and a half years, advancing to the position of assistant cashier. While in this bank he attended and graduated from the American Institute of Bank Clerks and also completed a three years course at the Wharton Evening School of the University of Pennsylvania. He was president of his class, from which he graduated in 1912.

WALTER PIERCE FRENCH

In 1921 he left the Girard National Bank to become assistant treasurer of E. J. Lavino & Company, Philadelphia, Pa., exporters and importers of ores, metals, etc., and later became treasurer of that company, a position he held until his death on March 24, 1925.

In 1904 he married Mary H. Bedford, sister of Frank A. Bedford, a member of the Board of Education of Philadelphia, who together with his mother and father, Mr. and Mrs. B. P. French, two sisters and one brother, survive him.

Mr. French, while always an active, charitable, and religious worker, was best known for his generosity. He gave freely of his money and advice to every worthy cause or individual. He was a member of the Logan Baptist Church, Masonic Lodge No. 271, the Down Town Club and the Philadelphia Association of Credit Men.

ARTHUR JACOB

Arthur Jacob died on April 3, 1925, at Hatch End, Middlesex, England, at the age of 57 years. He was a manager of the British Aluminum Company, Ltd. (which company he joined in 1908) responsible for the development of the use of aluminum for industrial purposes in general and electrical purposes in particular. He was charged also with the direction of certain of the company's subsidiary undertakings. Mr. Jacob was associated with Dr. S. Z. de Ferranti at the Grosvenor Gallery and Deptford from 1884 onwards. Subsequently, he was for many years engaged in the construction and management of electrical engineering undertakings, and had a personal connection with the leading engineers and directors of engineering concerns throughout the country.

Mr. Jacob was a member of the Overhead Wires Committee of the British Engineering Standards Association; also a member of the Overhead Wires Committee of the British Electrical Research Association. In addition to being a member of the Institution of Electrical Engineers, he was a member of the American Institute of Electrical Engineers, the American Eletrochemical Society, the Institute of Metals, and he was also identified with the work of the British Engineers' Association, the Federation of British Industries, the Industrial League and Council, and other organizations.

GEORGE SMART

George Smart, managing news editor of Iron Age, died recently at his home, 45 Deepdene Road, Forest Hills Gardens, Queens, after a week's illness of erysipelas. He leaves a widow, Lucy Allen Smart; a daughter, Helen, who graduated at Wellesley last year, and a son, Charles, a junior at Harvard.

Mr. Smart, born in Chillicothe, Ohio, 61 years ago, was educated at Ohio State University, and spent eight years on the Cleveland Plain Dealer. After a year with the Cincinnati Enquirer, he helped establish the Columbus Citizen, which he edited three years. From 1905 to 1917 he was editor of the Iron Trade Review of Cleveland, coming to Iron Age in the latter year.

The high standing of Mr. Smart in the opinion of his associates was evidenced by his prominence in various organizations. He had been president of Ohio State University Alumni Association, national president of Phi Kappa Psi Fraternity, chairman of the Editorial Conference of the New York Business Papers Association, member of the Executive Committee of the National Conference of Business Paper Editors and president of the Community Council of Forest Hills Gardens. At the time of his death he was president of the Men's Club of Forest Hills and chairman of the Student Aid Endowment Fund of Phi Kappa Psi.

JOHN ANGUS KERR

On May 25, 1925, John Angus Kerr, overcome by the shock of finding his daughter lying on the floor of the gas-filled kitchen in their apartment at 27 Washington Square North, New York, collapsed and died before he could reach the gas jet and perhaps save her life. The daughter, Mrs. Madeline Secec, was dead when her husband reached her side. Mr. Kerr was 68 years old, and former treasurer of the Ledoux Laboratories, New York.

Mr. Kerr was a native of Scotland and had lived in this country for many years. Until he gave up active business a few years ago, he was treasurer of the Ledoux Company.

Mrs. Secec was 35 years old. Her husband is secretary of the Argus Radio Corporation, 25 W. 18th street. Mr. Secec was overcome by the double tragedy. He said the action of the dog awakening the family probably had saved the lives of the others in the apartment.

HOWARD S. WHITE

Howard S. White of Waterbury, Conn., and Mrs. White were instantly killed in an automobile accident in Italy, while en route to San Remo, on May 2. Mr. White was secretary and general manager of the Homer D. Bronson Company of Beacon Falls, Conn. He was also president of the Puritan Manufacturing Company of Waterville, and had several other business connections, although he was active only in the Beacon Falls organization.

Mr. White prepared for Yale at Taft School in Watertown. He was graduated from Yale in the class of 1903 and joined the American Ring Company organization in Waterbury, remaining at that company until he was made secretary and general manager of the Homer D. Bronson Company of Beacon Falls.

Last fall, he was elected president of the State Golf Association. He was also president of the Waterbury Country Club and was state champion in 1916.

E. G. BUSH

E. G. Bush, aged 50, died on May 4 at a hospital in Duluth, Minn., following a month's illness. He was president of the Duluth Brass Works.

The late Mr. Bush was born in Green Bay, Wis. In 1920 he purchased the Duluth Brass Works, with plant at West Duluth, from the Ed. Hilliard estate, and he directed the enterprise along successful lines.

Mr. Bush was a candidate for city commissioner in 1921 and was active in many civic undertakings. He is survived by his wife, three children, Dorothy, Edward and Philip, all of Duluth, and Mrs. McIver, a sister.

NEWS OF THE INDUSTRY

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

NEW ENGLAND STATES

WATERBURY, CONN.

JUNE 1, 1925.

Business in local factories from the standpoint of orders and employment is better than it was a month ago according to local factory officials. **John A. Coe,** president of the **American Brass Company,** states that the prospects for the summer are very bright and that the company's plants are working nearly full time. The past month has shown a continuance of the volume of business done in the first quarter of the year which the company's statement recently issued, declared to be the largest in the history of the company.

John H. Goss, vice-president and general superintendent the **Scovill Manufacturing Company,** states that business with his concern is better and although some departments are still working short time, the number of man-hours per week is greater than a month ago.

It was stated at the **Chase Company** officers that while business for the first quarter had not been as great as anticipated, it was felt that the situation is in sounder shape and with better prospect of a reasonable volume of business continuing than a few months ago.

The record for 1924 of the **American Brass Company,** just issued, shows a total of 519,749,665 pounds of copper, brass and nickel silver fabricated during the year, an increase of over 14,000,000 pounds over 1923, itself a record year, and almost double the prewar five year average which was 266,000,000 pounds annually. Its operating profits, after interest, taxes and reserves was $16,052,689 or approximately two and one-half cents per pound on its output.

Rumored curtailment of copper output by the **Anaconda Copper Mining Company** in order to stabilize the market will not affect the local American Brass Company plants or mean any showing up of work at its plants, American Brass officials state.

Charles F. Brooker, chairman of the board of directors of the American Brass company, has been named a member of the **National Industrial Conference Board** of New York city which recently elected 13 members at large representing the largest industrial organizations in the United States.

John H. Goss, vice-president of the **Scovill Manufacturing Company,** was named a general director of the state Chamber of Commerce at the annual meeting last month.

Eight local, practical, skilled factory men were graduated last month, from the 18-month training school in shop practice which has been held on the top floor of the Chase office building under the supervision of some of the local factories and the Y. M. C. A. industrial department. Resolutions were passed thanking **John H. Goss** of the **Scovill Company** and **Stuart Gisrael** of the Y. M. C. A. for their interest and assistance. Mr. Gisrael initiated the movement and Mr. Goss gave the services of **Walter Barry,** the Scovill educational director. The men graduated were from the Chase companies, Scovill company, Bristol company and Waterbury Farrel Foundry company. The course is designed to fit these graduates to give practical and theoretical training to apprentices in various trades.

H. C. Weller of the **Fairfield Aerial Company** of New York has closed a contract with the Scovill Manufacturing Company to make an aerial survey of the local concern as soon as the company's aviators have completed a similar survey being made in Providence. The pictures will be taken at a height of several thousand feet and will show in complete detail the plant and its surroundings.

Edward L. Carter was elected president of the **Scovill Foremen's Association,** succeeding **Martin U. Lowe,** at the annual meeting of the association, last month. **George Hubbard** was elected vice-president, succeeding **Thomas Ashton. DeWayne France** was elected treasurer succeeding **E. L. Carter** and **Fred Packard** was re-elected secretary.— W. R. B.

BRIDGEPORT, CONN.

JUNE 1, 1925.

Over 400 progressive business and industrial firms are cooperating in the "Progress Exposition being held here this week. **Carl F. Dietz,** president of the **Bridgeport Brass Company,** is general chairman of the committee which is putting on the exposition. A successful Progress Exposition, he declared, will mean more to the city and its industries than any event ever held here.

A unique event will be consumated on June 3, 1925 when a thriving manufacturing business working 100 percent schedule on a full time bases with a full force of workers totalling 325 will be sold at auction. The firm is the **Electric Cable Company** with a large wire plant on Bunnell street. The plant has been operating under a receivership and will be sold to satisfy the bondholders and to wind up the affairs of the receivership. The receivership was brought about when the company found itself with large stocks on hand bought in a strong market when the bottom dropped out of the wire market two years ago. Nevertheless it is one of the few firms in the city that has been running on a 100 per cent basis and full time schedule for the past year. It is expected that the reorganization group will bid in the property and the concern will be continued under a reorganized management.

Bridgeport will have another distinct locational advantage for new industries as the New Haven road, it has been learned, plans and has appropriated funds for, a modern freight terminal at 132nd street and Harlem river which will cut out many delays now necessary because of transfer to various piers. The terminal will be a blessing according to the traffic men of local factories for freight destined for New York vicinity and quick delivery. It may save as much as a whole day in certain deliveries. The New Haven road is also planning a store door delivery by which factory shipments from Bridgeport can be in the warehouses or stores in New York the morning following shipment.

Seventy members of the **Veterans Association** of the **Crane Company,** which includes all who have been in service 25 years or more, attended the 70th anniversary celebration of the company in Chicago, last month. Other veterans attended from the New York and Chicago plants.

The **Lake Torpedo Boat Company** has filled a claim of $800,000 against the government for losses on contracts for submarine construction taken prior to the war and incurred when prices of materials and labor rose. If allowed, it will permit the company to make further redemption of its capital stock some of which has been retired by sale of the plant here. The company is still in the submarine business but rents its patents on a royalty basis instead of manufacturing itself. The **Bridgeport Dredge and Dock Company** which bought the Lake company's property will open a shipyard for the construction and repair of vessels within the next month. Three shipowners have already given the company contracts for the repair of their boats.

The $1,500,000 new stock issue of the **Columbia Graphophone Company, Ltd. of England** which recently acquired the controlling interest in the Columbia Phonograph Company of this city was overscribed 10 times within five minutes after it was offered, according to **Louis Sterling** of this city, chairman of the board of the Columbia Phonograph Company.

George D. Stearns of the **Bridgeport Rolling Mills,** at a meeting of the Kiwanis club, last month, gave a history of brass making in England and America, placing the date of the first brass rolled in America as 1802 and the place as Waterbury. A wise man once said, he stated, that all that was required to make a brass man was great muscles in the back and great thickness in the head. If there ever was any secret in the brass business, that man gave it away.—W. R. B.

TORRINGTON, CONN.

JUNE 1, 1925.

Though the tonnage shipped by the metal industries of Torrington during March of this year was larger than the tonnage during March of last year, business has slowed down considerably. One prominent Torrington manufacturer remarked, however, in an interview with a METAL INDUSTRY representative, that despite this slow down there is more business to the square inch in Torrington than in any other city of Connecticut with one exception. The outlook is good and the leaders of the industry here are optimistic.

There is practically no unemployment here. The few men released from the shops have found no difficulty in securing work on road jobs in this section, while the farms are absorbing some of the unskilled workers who otherwise might be idle. Condition of sales is good, though the orders continue small. The parcel post shipments are larger than ever before as a result of this tendency toward smaller orders.

Taking it altogether the outlook for late spring and early summer, insofar as Torrington industries are concerned, is satisfactory.

Schedules conforming the daylight saving were adopted by Torrington factories April 26, on which date the New Haven railroad's daylight saving schedule went into effect.

Thomas Moriarity, who was engaged in experimental work at the **Turner & Seymour** plant for a number of years, has left the employ of that concern and moved to Amherst, Mass., where he has engaged in business for himself.

Suit has been filed in the superior court for this county to revoke the sale of the **Trumbull-Vanderpoel** plant at Bantam by **Floyd L. Vanderpoel** of Litchfield to a group of four prominent Connecticut men—**John H. Lancaster** of Litchfield, **Ralph K. Mason** of Bantam, **R. R. Healy** and **W. A. Jackson** of Hartford. The contract of sale as annexed to the complaint shows that the $150,000 factory was sold without a cent changing hands, the purchasers agreeing by note, payment ten years hence, to settle their obligation. The suit charges the new owners of the factory are mismanaging the business and are paying themselves exorbitant salaries.

Miss Mary L. Brooker, aged 71, sister of **Charles F. Brooker** of the **American Brass Company,** died April 18 at the Maria Seymour Brooker Memorial in Torrington, where she had been living for the past two years. Death followed a stroke of paralysis. Her death leaves Charles F. Brooker as the last survivor of a family of six children.—J. H. T.

NEW BRITAIN, CONN.

JUNE 1, 1925.

Summer approaches with business conditions at local factories going along smoothly. There was no great stimulus during the late spring, nor is there indication of any unusual spurt this summer. At the same time the officials of practically all concerns here are unanimous in declaring that the outlook for summer business is at least up with the average. There certainly is no slump, even if there is no boom. Indications are that general conditions about the country will be reflected here and should the building business speed up to any extent it means that there will be an increased demand for local products.

The **Traut and Hine Manufacturing Company** passed into history on May 28, 1925 when the stockholders met and ratified the action of the directors in voting to dissolve the corporation. The realty and assets of the company have been purchased by the **North & Judd Manufacturing Company.** The Traut and Hine company began business back in 1888, manufacturing harness trappings, buckles and during the last few years specializing in all sorts of metal novelties. The concern was something of a competitor to the North & Judd company which has now taken it over.

The **American Hardware Corporation** has declared two special dividends of one dollar each and a regular dividend of seventy five cents on its half million shares of stock. The total dividend distribution from this action means the payment of one million three hundred seventy five thousand dollars to stockholders.—H. R. J.

PROVIDENCE, R. I.

JUNE 1, 1925.

Metal industries throughout Rhode Island are contradictory, some lines being at the lowest ebb in a number of years, while others are showing a considerable improvement over recent periods. In the former class are the jewelry lines and the small tools and machinery lines, while all lines of the building trades are not only the business for months, but are showing an inclination toward further improvement.

The **L. & B. Sheet Metal Works,** 73 Elm street, Providence, are owned and conducted by Arthur J. Labelle and John Baronian, according to their statement filed at the city clerk's office.

Charles H. O'Brien, Joseph B. Granger and Ansel E. Barton are the owners of **The All-Metal Weathestrip Company of Rhode Island,** of 16 Decatur square, Providence, their returns at the city hall disclose.

Warwick Brass Foundry, Inc., has been incorporated under the laws off Rhode Island to conduct a general foundry business at Warwick with a capital stock of 500 shares of common stock without par value. The incorporators are William G. Morgan, Leroy Brown and Frank T. Downing, all of Warwick.

Business at the plant of the **Standard Nut and Bolt Company,** Valley Falls, has taken a turn for the better during the past month and although the officials are not making any loud proclamations the prospects are said to be very encouraging.

The schedule of assets of the **Frank Mossberg Company** of Attleboro, which was presented to the United States District Court the first of this month, to show the condition of the business for the first quarter of the year, discloses that although the concern is in the hands of a receiver, it is experiencing its greatest boom in five years and is daily turning a cash balance which would more than meet the interest on the bonds that are outstanding.

The court record gives credit to **Lewis R. Smith,** plant receiver, for the improvement in the condition of the business. The record that he has made is revealed in the report for the period from January 12 to the end of March, while the April record, which is not included in the schedule, is stated as being equally as good. The prospect of continued employment at full time for the 200 or more employes was never better than it is at present.

There is a court decree of sale of the plant, a customary legal procedure in the fulfillment of the desire of the bondholders to realize on the bonds which they hold, but the concern can be disposed of only as a unit and as a going concern, the court has ordered.—W. H. M.

MIDDLE ATLANTIC STATES

ROCHESTER, N. Y.

JUNE 1, 1925.

Very slight improvement in business activities are reported by Rochester industrial leaders. A few of the larger plants report a noticeable increase in orders, which is readily seized upon by the more optimistic group.

The same uncertainty that pervades all sections of the country is present in Rochester. There are those, however, officials of the **Bausch & Lomb Optical Company,** the **Yawman & Erbe Company,** and the **General Railway Signal Company,** who feel that an industrial expansion is actually due before the Fall. All three companies claim their individual businesses are as satisfactory as a year ago. Inquiry has failed to locate a single Rochester metal-using plant that is at all affected by foreign competition.

Brass foundries in Rochester are operating on a lighter basis than earlier in the year. About two-thirds of the workers attached to the industry are employed, the other having found employment in other callings. Business conditions are

reported good at the plants of the **Todd Protectograph Company** and the **Pfaudler Company** in Lincoln Park.

Much interest is attached to the merger of the **Shur-on Optical Company** of this city with several of the leading optical concerns of the country. The new corporation will be known as the **Shur-on Standard Optical Company,** and today New York bankers have offered the company's first mortgage bonds to the public as an investment. Expansion of operations in the Rochester plant is predicted. Much gold, silver, brass, aluminum and antimony are used in the Shur-on plant.—G. B. E.

NEWARK, N. J.

JUNE 1, 1925.

By a Chancery Court order the **Radio Corporation of America** is temporarily prohibited from seeking in any wey to learn the methods and trade secrets of the **De Forest Radio Company,** of Jersey City, N. J. Vice Chancellor Backes signed the order on the application of the De Forest concern which charged that the defendant had used illegal methods to get knowledge, machinery, implements, processes and experimental work carried on by the De Forest concern in the development of the science of radio. The De Forest company alleged that the corporation had used its employes to gain the secrets of the complainant's by taking positions in its employ under assumed names. The vice chancellor's order commands the Radio Corporation to immediately deliver to a special master all reports and other data the defendant is charged with having fraudulently obtained from the De Forest concern.

Involuntary bankruptcy proceedings have been instituted in the federal court against **Charles A. Becker,** president of the **Charles A. Becker Company,** jewelry chain manufacturers, of Newark, N. J. Judge Runyon appointed **Harry Green** receiver for the company. Becker's assets are estimated at $20,000. Similar proceedings were filed against the **Barnes Foundry Company,** Jersey City, N. J. A voluntary petition in bankruptcy has been filed by the **Passaic Radio Service,** Passaic, N. J.

The following Newark concerns filed articles of incorporation: **Collway Foundry, Inc.,** castings, 1,000 shares no par; **Roth Plumbing and Heating Company,** supplies, $50,000 capital; **Liberty Radio Manufacturing Company,** radio supplies, $125,000 capital; **Davis-Urdang Electric Company,** electrical supplies, $3,000 capital; **Dependable Electric Corporation,** electrical supplies, $10,000 capital; **Duo Tone Radio Corporation,** radio supplies, $50,000 capital; **Newark Lighting Wares, Inc.,** radio supplies, $25,000 capital; **Continental Lamp Company,** electrical business, $2,000 capital.—C. A. L.

TRENTON, N. J.

JUNE 1, 1925.

Business is not very brisk at many of the metal plants, but the manufacturers believe that conditions will begin to improve in a short time. Trenton is the largest pottery centre in the East and when that line is dull it has a telling effect upon the metal industry, considerable brass being used in the production of certain pottery ware. Certain lines of harware are in demand because of the great amount of early summer building.

Lewis H. Lawton, secretary and general manager of the **Jonathan Bartley Crucible Company,** has been elected president of the Trenton Association of Credit Men, a new organization recently formed. **Harvey Cooley,** of the **John A. Roebling's Sons Company,** has been made one of the directors.

Harley A. Hulslander, president of the **Hulslander Manufacturing Company,** has been elected commander of Palestine Commandery, Knights Templar, of Trenton.

The following concerns were chartered here: **Parsons Electrical Supply Company,** electrical supplies, $25,000 capital, Camden, N. J.; **Curvfit Razor Company, Inc.,** manufacture safety razors, 4,500 shares no par, East Orange, N. J.; **Kenlin Radio Corporation,** radio supplies, $100,000 capital, Trenton, N. J.; **Crilly Mercury Anti-Friction Metal Corporation,** castings, $100,000, Jersey City, N. J.

Colonel Washington A. Roebling, president of the **John A. Roebling's Sons Company,** Trenton, N. J. on May 26 celebrated his eighty-eighth birthday. In the past the successive birthday anniversaries of Colonel Roebling have been marked by gatherings of relatives and friends. The last anniversary was confined to members of Mr. Roebling's immediate family.—C. A. L.

PHILADELPHIA, PA.

JUNE 1, 1925.

From present indications, the metal market in the Philadelphia district appears promising. Although orders have not been voluminous, small consignments of all metals have been shipped during the last few weeks. Builders have come into the market with firm inquiries, but with a desire to purchase under market quotations. Prices already are so low, however, that merchants are unwilling to dispose of their stocks at the bids. It is probable, however, that this reluctancy will not continue long. Stocks of metals in Philadelphia, although not large, are sufficient to cover all requirements for some time. Sheet copper and tubes are moving in better quantity, with the demand for these materials coming principally from operating builders and the allied trades.

Aluminum sales in the Philadelphia district for the last three weeks have been greater than for some time.

Copper prices are firm, with some little transactions reported.

Tin market has been without any especial interest, with prices remaining firm. It is probably the quietest period for many months.

There is better demand for lead than for some time, with a tendency toward a strengthening of prices. Galvanizers are more active, with inquiries for lead.—A. F. C.

PITTSBURGH, PA.

JUNE 1, 1925.

Industrial operations do not show much change, although slightly less active in metal lines. Automobile trade is active, retail sales being good, and motor trucks are selling freely. Radio trade is seasonably quiet, while electrical equipment orders have been fair. Building materials are moving very well. Hardware sales, particularly in seasonable lines, are better. Mill and mine supply business is dull.

From Rochester, Pa., it is reported that a charter has been asked for a newly formed company to be known as the **National Pipe Products Corporation of Rochester.** Officers of the new company are A. J. Townsend of Beaver, president; W. S. Townsend of Rochester, vice-president; Al Blackstone of Beaver, general manager, and John K. Ambrose of Rochester, secretary and treasurer. Directors are A. J. Townsend, W. S. Townsend and C. A. Bowden of Beaver. The company has installed equipment in a building formerly used by the Guarantee Liquid Measure Company in Railroad street, and will prepare pipe nipples, pipe bends, syphons, coils and various other products in the iron, steel and brass pipe. One department will be devoted to the nickel plating of pipe. Orders have been received to insure continuous operations for many months.—H. W. R.

MIDDLE WESTERN STATES

CLEVELAND, OHIO

JUNE 1, 1925.

Employment conditions in this city and northern Ohio have been on the upward trend for the past month. The metal trades are progressing steadily.

The **Union Metal Manufacturing Company** at Canton, said to be the largest manufacturers in the world of metal lighting standards, and employing 300 men, has been purchased by a syndicate of Cleveland and Canton men. John Sherwin, chairman of the board of the Union Trust Company, Cleveland, is one of the group, while the Canton members are

Harry R. Jones, R. V. Mitchell, Charles W. Wild and R. L. Rice. The management of the plant will remain as it has been in the past with Charles C. Barrick as president and W. L. Porterfield as general sales manager.

The newly incorporated **Superior Bronze & Aluminum Company** of Warren has started work on its new 40 x 100, $10,000 plant in that city. Arthur J. Gilmore, president and general manager of the new firm, came to Warren in 1918 and was affiliated with the Trumbull Bronze Company. He had previously managed foundries in the east and west. The firm, which will turn out high grade castings, expects to be operating within the next month. The incorporators are Mr. Gilmore, Mrs. Elizabeth Gilmore, Frank W. McNeilly, Mrs. Ethel McNeilly and Frank W. Boyle.—S. D. I.

DETROIT, MICH.

JUNE 1, 1925.

The **Lavigne Brass Company** has recently been incorporated in Detroit with a capital stock of $50,000 for the purpose of manufacturing and dealing in metal articles. The stockholders are Joseph P. Lavigne, Frank E. McArthur and E. C. Hudson. The company is at 5465 Lincoln avenue.

The **D. J. Ryan Foundry** building at Ecorse, a suburb of Detroit, suffered a fire loss recently estimated at $30,000. Many workmen were endangered by the flames which spread rapidly. The flames started in the haymow of a stable near the foundry. The stable, garage and a considerable part of the main building were demolished.

The **McCord Radiator & Manufacturing Company** reports for the quarter ending March 31 net earnings of $222,056, after allowance has been made for all charges and taxes.

An explosion took place recently in the engine room of the **Shepard Copper & Brass Company's** plant, 11831 Charlevoix avenue, blowing out the windows and destroying a small section of wall. The police found, it is stated, that a small dynamite bomb had been tossed into the engine room.

The **Superior Electric Plating Company** has recently started business in Jackson. Its owners are Montford Thayer, of Jackson and L. P. Chapman, of Chicago.

The **Detroit Aluminum & Brass Corporation** has been incorporated with a capital stock of 250,000, for the purpose of manufacturing and dealing in metal products. The stockholders are John P. Carritte, 112 Edison avenue, Detroit and Lloyd G. Hooker and John P. Carritte, Jr., also of Detroit.

Manufacturing jewelers just now are passing through a decided slump in business. This also is extended to the retail trade. Jewelry is regarded as a luxury and the business has felt the depression for a considerable time. Most of the Detroit manufacturers, except those engaged in some special line, are not operating to any great extent.

The **Stout Metal Airplane Company** is making changes in its plant at the Ford airport in Dearborn to accommodate a quantity production schedule, according to Stanley K. Knauss, general manager. The fourth Stout all-metal air Pullman has been rolled out of the shop. Work on the great mooring mast for the landing of dirigibles has almost been completed.—F. J. H.

INDIANAPOLIS, IND.

JUNE 1, 1925.

John Lavelle, Anderson, Ind., head of the **Lavelle Foundry Company,** announces the re-opening of its foundry plant in Indianapolis. The Indianapolis branch has been closed down for several months. Business, according to Mr. Lavelle, is steady and the three plants, two in Anderson and one at Indianapolis, are to operate steadily.

James H. Howard, 57 years old, president of the **Utility Stove and Range Company,** Indianapolis, died recently. He had been in ill health for some time, having suffered an attack of influenza earlier in the year. He was in a hospital at Hot Springs for some time and had just returned to Indianapolis a week prior to his death. For the last two years he had spent much time traveling over the world. He was widely known among stove manufacturers throughout the country. He was the inventor of numerous patents for stoves and heating appliances. He was born in Detroit, but settled in Indianapolis thirty-five years ago. In 1910 he married Miss Grace Kremer of St. Louis, who survives.—E. B.

CHICAGO, ILL.

JUNE 1, 1925.

Dealers in metals in the local markets are agreed in the opinion that the situation in the industry has during the last few weeks assumed an aspect of gratifying activity. For some time metal dealing has been marked with an unusual quietness, but this now seems to have left and the trading is gathering momentum each day.

Ben Friedman, Chicago manager of the **Atlas Publishing Company of New York** and one of the most widely known waste material men in this city, has taken a position as purchasing agent of the **Metals Refining Company** of Hammond, Ind. He has been associated with the Atlas Publishing Company, publishers of the Waste Trade Journal, the Daily Metal Reporter, the Daily Mill Stock Reporter, Sales, and other trade journals for 20 years.

The factory at the northeast corner of Fullerton and Surrey court has been sold by the **R. H. Burke Company** to the **Club Aluminum Company** for a reported $98,000.

Samuel Savitt, manufacturer of metal specialties and novelties, previously located at 12-14 South Jefferson street, has leased space on the third floor of the building at 162 West Austin avenue at an annual rental of $1,800.

The Metal Devices Company, manufacturers of metal specialties, has purchased from the **C. J. Sykes Manufacturing Company** the factory building at the southwest corner of Maplewood avenue and Schubert street, for $45,000 subject to $26,750. The Metal Devices Company is planning to build later on the vacant part of the 100 by 125 foot tract.

The **Harvey Smelting and Refining Company,** 147th street and Marshfield avenue, Harvey, Ill., has been chartered by the secretary of state with a capital of $25,000, to deal in and smelt and refine all grades of metals. The incorporators are Harry A. Silverstein, Meyer Silverstein and John P. Gavaris.

Several other incorporations of interest to the trade are:

Perfection Cook Ware Corporation, 547 West Lake street, capitalized at $50,000 to manufacture aluminum utensils, fixtures, parts and accessories. The incorporators are John A. Taft, R. L. McVean and J. C. Reis.

Stop Plug Company, 118 North LaSalle street, capitalized at $60,000 to manufacture hardware. The incorporators are Max Arnold, K. W. Kempf, Joseph F. Pastor, C. H. Oberheide and Otto C. Kraemer.

Clawson & Bals, Inc., 4701 West Lake street, capitalized at $50,000 to manufacture auto accessories. The incorporators are John Z. Clawson, Anthony F. Bals and Frank Dvorak.

Wilson & Parr, Inc., 130 North State street, capitalized at $20,000 to manufacture in gold and silverware, watches, jewelry, etc. The incorporators are Harry E. Parry, Morgan R. Evans and Joseph C. Van Shaick.

Freeport Radio Corporation, 111 Stephenson street, Freeport, Ill., capitalized at $2,250 to manufacture and deal in electrical, mechanical and scientific apparatus, devices and supplies. The incorporators are A. L. Stephen, W. L. Karcher and F. Bach Vannuys.—L. H. G.

OTHER COUNTRIES

BIRMINGHAM, ENGLAND

MAY 19, 1925.

J. Howard Cartland, presiding at the meeting of **James Cartland & Sons,** Birmingham, England, said he had just returned from a three months' tour in South Africa, where in the principal towns he found competition very keen. There were probably more brass foundries than the trade demanded, and in these keen times of competition 5 per cent or 2½ per cent would turn the scale, and the British maker lost orders.

Competition was quite as keen in the Australian colonies.

The **Birmingham Guild, Ltd.**, which specializes on highly artistic metal production has secured the order for a casket in which the scroll conferring the freedom of the City of London on the Earl of Oxford and Asquith will be contained. Usually the casket is of silver gilt, but on this occasion it is to be made of 18 kt. gold. The invariable rule is that such orders should be executed in London and in this case a proviso is laid down that the Company's craftsmen shall manufacture the casket in that city.

The Gold Medal of the Institution of Mining and Metallurgy has been awarded to **Dr. Richard Pearce,** in recognition of his life long services in the advancement of metallurgical science and practice. Dr. Pearce was for many years engaged in the direction of important metallurgical operations in the United States, and since his return to England has been actively engaged in developing the tin smelting industry, one result being the erection and successful operation of the important tin smelting works of **William Harvey & Company,** at Bootle, near Liverpool.

Douglas Johnstone, presiding at the annuel meeting of **H. H. Vivian & Company,** manufacturers of brass and similar tubes, stated that owing to the slump in the shipping trade the company had suffered in common with other tube manufacturers, but in spite of the difficulties the orders this year showed an improvement in all departments with the exception of that of brass wire.

The **British Non-Ferrous Metals Research Association,** supported by a large number of metallurgical and engineering firms, during the past five years has expended in research £20,000 provided by the members in addition to a similar sum in grants from the department of scientific and industrial research. Schemes in view contemplate an annual expenditure of £20,000 a year, towards which the department has promised a further **£10,000 to be spread over** the next five years. The great railway companies are assisting in the carrying out of special researches on firebox stays.

Several reductions in brass goods have been made by Birmingham manufacturers as the result of the fall in copper values. A few days since the manufacturers of strong copper plates and rods reduced their price from £90 to £89 per ton which is the second reduction within a month.

After a long period of dulness the Birmingham jewelry and silversmiths' trade has lately undergone a marked improvement which is affecting nearly all branches. The improvement extends both to home and foreign trade, enabling additional hands to be taken on.

A matter in which Birmingham jewelers are taking great interest is the Gilt Bill which has passed its first reading, and it is hoped will soon be read a second time. It relates to rolled gold and imitation jewelry generally, which has never yet had a statutory meaning. The Bill will now exactly define these materials, equally for the guidance of the manufacturer, the merchant and the public.

The rapid extension of wireless telegraphy is having a most important influence on the Birmingham brass and metal trades, several factories having set up special deartments for the manufacture of accessories. The city, in fact, is gradually becoming the recognized centre for the principal wireless instruments and accessories. Transformers and plugging coils are demanded in large quantities. Germans and Americans are, however, now competing for this business. Prices have been rather severely cut but the manufacturers, so far, have not suffered.

An exception to the general activity is that of brass wire in which German competition appears to be making headway, that country offering wire at prices with which Birmingham manufacturers find it impossible to compete.—H.

Business Items Verified

Radiant Heat Corporation of America has moved to 25 Wilbur avenue, Long Island City, N. Y.

Manhattan Modeling & Chasing Company has removed to 2 Lispenard street, New York City. This firm does designing, modeling and mold making for all purposes.

Hilo Varnish Corporation has opened a branch office in Pittsburgh, Pa., at 218 Third avenue. A. G. Russell will look after the industrial field and Ben Bower will take care of the jobber and dealer trade.

W. J. Westaway Company, Hamilton, Ont., Can., has been appointed district representative for the Farrel Foundry & Machine Company, Buffalo, N. Y., and will cover the eastern half of the province of Ontario.

The **American Polishing & Plating Works** have removed from 103 Mott street to 125 Baxter street, New York City. This concern manufactures a line of silver plated soda fountain sundries, and does replating and repairing.

George R. Meneely & Sons, Inc., brass foundry, Watervliet, N. Y., filed a schedule in bankruptcy at Utica, N. Y., March 18, with liabilities of $163,805 and assets of $142,414. The Meneely firm has been in business for many years.

The **Magnuson Products Corporation,** 410-12 Third avenue, Brooklyn, N. Y., has established a branch in Chicago, Ill., where warehouse stocks are now being carried. The office is located at 16 North Market street, in charge of Fred J. Fayen.

Guarantee Electro Plating Company is now located at 635 Eleventh avenue, New York City. This concern has taken larger quarters and equipment for the plating of dentists' fixtures and automobile work, as well as a general jobbing line.

Dixie Furnace Lining Company, Jackson, Tenn., has been organized to manufacture refractories. It is renting space and equipment from the Jackson Clay Products Company and will specialize in plastic furnace lining. A. T. Leahy is one of the officials.

F. Adamac has purchased the plant of the M. A. Modeling & Chasing Works, 324 Fifth avenue, New York City. He has removed to larger quarters at 117-119 West 26th street, where he will specialize in designing, modeling, mold and pattern making and chasing.

Riehle Brothers Testing Machine Company, 1424 North Ninth street, Philadelphia, Pa., has inaugurated a new policy of sales and service through the establishment of a branch office at 30 Church street, New York City, under the personal direction of Abbott F. Riehle.

The **Baltimore Brass Company,** Baltimore, Md., has joined with its employees in establishing a group life insurance with the Metropolitan Life Insurance Company. The contract was written on the cooperative basis, whereby employer and employees jointly pay the premiums.

Samuel Brown, Ltd., 31 Johnston street, Wellington, New Zealand, is interested in the purchase of copper, steel, brass, bronze materials, galvanized nuts and bolts and kindred equipment. This firm acts as sole New Zealand representatives for various English manufacturers.

Enterprise Iron Works, Albert Lea, Minn., manufacturer of gray iron, semi-steel, bronze and aluminum castings, has been sold to D. A. Potter, heretofore a resident of St. Paul, Minn. This firm operates the following departments: brass, bronze and aluminum foundry; casting shop, japanning.

During the first week in June the heat was so great in Ansonia, Conn., that it set off an automatic fire sprinkler which suddenly turned loose a shower bath on hundreds of workmen in the plant of the **American Brass Company.** Some of the factories there closed in the afternoon and outdoor workers quit.

The affairs of the **Penton Publishing Company,** Cleveland, Ohio, the death of whose president, A. O. Backert, was announced in our May issue, will be continued by its founder, John A. Penton, chairman of the board, and the other directors, all of whom have been members of the Penton organization for many years.

The following officers were re-elected at the Eighth Annual meeting of the stockholders of the **Apollo Metal Works,** La Salle, Ill., held recently. Edward A. Carus, president; Harry O. Schuessler, vice-president; Dr. Leon Urbanowski, secretary; E. Talcott Barnes, treasurer. Harry O. Schuessler was also re-appointed general manager.

The **Zenite Metal Company,** Indianapolis, Ind., has acquired control of patents for a steel and aluminum motor-driven clothes wringer, gearless type and will establish a division at its plant for the manufacture of this wringer.

Equipment will be installed to provide for an initial output of about 6,000 machines a month. This firm operates the following departments: tool room, grinding room, brazing, plating, japanning, stamping, tinning, polishing.

The plant of the **Victor Saw Works,** Rowland avenue, Springfield, Mass., has been bought by **James L. Shannon,** manufacturer of brass, and steel novelties. Mr. Shannon is principal owner of the Blake Manufacturing Company. The latter firm will remove its business from its present plant on Taylor street to the Victor plant. The following departments are operated: tool room, grinding room, cutting-up shop, spinning, plating, japanning, stamping, soldering, polishing, lacquering.

The **Hoskins Manufacturing Company,** Detroit, Mich., now using two electric induction furnaces in the production of chromel and similar alloys, recently ordered a third electric unit for installation with the others. The two original furnaces are of General Electric manufacture and the third, now on order with the General Electric Company, will be of the latest type with the winding located above the bath and cooled by air blast. It will have a holding capacity of 650 pounds of metal, and each pour will be about 400 pounds.

The **National Smelting Company,** Cleveland, Ohio, announces that it has been appointed exclusive sales agents for the United States and Canada for aluminum sheets, strips and coils, manufactured by Lehmaier, Schwartz & Company, at their aluminum rolling mill, at Glendale, L. I. The National Smelting Company will continue to manufacture as heretofore aluminum ingots and aluminum alloys. The sales policy of Lehmaier, Schwartz & Company on tin and aluminum foils is unchanged, and Lehmaier, Schwartz & Company will continue to sell their output of tin and aluminum fail direct as heretofore.

Industrial Works, Bay City, Mich., manufacturers of locomotive cranes and crane equipment, announce the opening of two new district offices, one at 425 Whitney Central Building, New Orleans, La., in charge of John A. Abele, district sales manager, and the other at 843-A Hurt Building, Atlanta, Ga., in charge of J. J. Murphy, district sales manager. The company also announces the appointment of four additional district sales engineers, D. J. Calder, C. J. Neacy and M. J. Frankel, with offices at the Chicago district office, 1051 McCormick Building. C. F. Delbridge will be located at the St. Louis district office, Railway Exchange Building.

BRONZED DIANA REMOVED

Diana, goddess of the chase, the bronzed lady about whose graceful form such a storm of surprise burst when she was raised to her pedestal above Madison Square Garden, New York, many years ago, has been lifted down. She will be placed in storage for a time, and when the tower from the Garden has been taken down and re-erected south of Gould Hall at New York University, Diana will go back to the top again.

The statue is not cast but made of beaten sheet copper, gilded. The figure, over 13 feet high, was made in Salem, Ohio, and is the second statue of Diana so made. The earlier one was three feet higher and stood on top of the Agricultural Building at the World's Fair in Chicago, Ill., where it was destroyed by fire. Both figures originally turned as weather vanes.

SHEET STEEL PUBLICITY

Twenty-eight manufacturers of sheet steel, comprising 92 per cent of the total capacity of the sheet mills of the United States, have entered into an agreement to promote a plan which has been under consideration for several years. The plan is the extension of the trade in sheet steel and the finding of new uses for that product. An advertising and circularizing campaign will be carried on; also general publicity in the form of "news" stories. The work is done through a Trade Extension Committee, of which G. H. Clark, vice-president of the United Alloy Steel Corporation, New York, is a member.

COPPER CONSUMPTION

According to data published by the Copper and Brass Research Association, copper consumption in specific industries is as follows:

Washing machines	10,000,000	lbs.	per	year
Lighting fixtures	30,000,000	"	"	"
Paper making equipment	8,000,000	"	"	"
Automobiles	165,000,000	"	"	"
Safety pins	5,700,000	"	"	"
Insect screen	8,500,000	"	"	"

BRASS SAFETY PIN MADE BY BLOOMFIELD CONSOLIDATED PIN COMPANY, BLOOMFIELD, N. J.

METALLURGICAL RESEARCH FELLOWSHIPS

In co-operation with the United States Bureau of Mines and the State Mining Experiment Station, the School of Mines and Metallurgy of the University of Missouri offers four fellowships. These fellowships are open to graduates who have the equivalent of a Bachelor of Science degree and have had the proper training in mining, metallurgy, or chemistry, and who are qualified to undertake research work. The income of each fellowship is $800 per annum for the twelve months beginning July 1, 1925. Fellows pay fees amounting to approximately $30 per year. The fellowships will be granted in the Metallurgy of Zinc, Refractories for Metallurgy of Zinc, Physical Metallurgy (heat treatment of steel). Applications, with a certified copy of collegiate record, statement of professional experience, and names and address of three references will be received up to June 15, 1925. The application should be addressed Director, School of Mines and Metallurgy, University of Missouri, Rolla, Missouri.

NEW ZINC ROLLING MILL

The Hegeler Zinc Company has built a new strip rolling mill in Danville, Ill. The mill is equipped to produce zinc strips for running board binding for motor cars, for floor boards and similar purposes, huge slabs of boiler plate, zinc strips and buttons, which are used in the manufacture of dry battery cells, etc.

The mill is modern in every detail being equipped with the latest and best machinery. The main building is 200 x 250 feet of brick and steel, with steel floor laid on concrete. It has the improved skylight system and is equipped throughout with Cooper-Hewitt lights so that it may be operated 24 hours a day.

In a later issue of THE METAL INDUSTRY a more detailed description of this mill be published, with suitable illustrations.

ROME WIRE DEBENTURES

The Rome Wire Company, Rome, N. Y., has issued $3,000,000 in 6% sinking fund debentures, due June 1, 1940 at 100 and interest to yield 6%.

The Rome Wire Company was incorporated twenty years ago and is today one of the largest manufacturers in the United States devoted exclusively to the manufacture of copper rods, copper wire and insulated electric wires and cables. The plants are located at Rome, New York, and Buffalo, New York.

The proceeds of this issue will be used for the retirement of $2,409,000 three-year notes which will be called on July 1, 1925, and will also provide additional working capital.

LEAD IN 1924

COMPILED BY C. E. SIEBENTHAL AND A. STOLL, DEPARTMENT OF THE INTERIOR, GEOLOGICAL SURVEY

Production of refined primary lead in the United States:

	1922 Short tons	1923 Short tons	1924 Short tons
Domestic desilverized lead	185,191	291,760	299,343
Domestic soft lead	209,250	190,749	203,615
Domestic desilverized soft lead	74,305	61,332	63,449
	468,746	543,841	566,407
Foreign desilverized lead	63,916	74,481	124,086
Total refined primary lead	532,662	618,322	690,493
Antimonial lead	8,075	14,190	20,787
Apparent consumption of refined primary lead in the United States (refinery stocks disregarded)			
Supply:			
Stocks in bonded warehouse, Jan. 1	347	.....	2,617
Imports of pigs, bars and old metal	3,551	21,099	12,247
Production	532,662	618,322	690,493
	536,560	639,421	705,357
Withdrawals:			
Exports of foreign lead—			
From warehouse	32,355	*a* 48,736	76,758
In manufactures, with benefit of drawback	5,677	12,526	*b* 11,286
Exports of domestic lead	5,823	1,999	5,332
Stocks in bonded warehouse, Dec. 31	....	2,617	5,045
	43,855	*a* 65,878	98,421
Apparent consumption	492,705	*a* 573,543	606,936
Imports and stocks in warehouse:			
Imports of lead in ore and matte	12,237	33,441	48,660
Imports of lead in bullion	62,037	80,748	77,751
Remaining in warehouse, Dec. 31: *c*			
Lead in ore and matte	5,235	38,016	51,737
Lead in bullion	3,538	40,153	47,504
Price: Average selling price in cents and pounds	5.5	7.0	8.0

a Revised figures. *b* Figures for last quarter not available.

c Some part of this may have been smelted and refined and thus be included in the quantities as "Foreign desilverized lead."

RHODES COMPANY EXPANDS

James H. Rhodes & Company, Long Island City, New York, have taken over the entire stock and good will of T. Van Amringe & Son of New York and Mamaroneck, N. Y. T. Van Amringe & Son were established in 1842 and were the oldest grinders of pumice stone, rotten stone and other abrasives, in the United States. The standard of quality of their product will be maintained. The Rhodes Company is said to be the largest grinder of pumice stone in the world, having a branch warehouse at Canneto-Lipari, Italy, where the pumice is mined, and the grinding plant at Long Island City being the largest ever built. Stocks are carried in Chicago and Detroit, as well as Long Island City, and prompt shipment of practically every grade can now be made with these excellent facilities. They also produce sponges and manufacture felt and buffing wheels. They were organized in 1898.

INTERNATIONAL NICKEL IMPROVED

Earnings of the International Nickel Company for last year were the best since the close of the World War, according to the annual report submitted to stockholders by Robert C. Stanley, president of the organization. Total income for the fiscal year ended March 31, 1925, aggregated $5,109,199, against $3,025,654 in the previous year. After allowing for all expenses, and deduction of reserves for depreciation, depletion and other charges, the company reported net profit of $2,924,057 for the year, against $1,206,486 in the previous year. This was equal, after allowing for preferred dividends, to $1.43 a share earned on the 1,673,384 shares of capital stock of $25 a share par value outstanding, against 40 cents a share earned the year before.

In his report of operations Mr. Stanley told the stockholders that "distribution of nickel and rolled products is steadily becoming more diversified, a condition which should lead to increased and stabilized earnings. The general plan of exploitation, including research, field service, publicity, and advertising, introduced during the last three years, has shown gratifying results and will be continued and its scope extended as the volume of permanent business grows.

"The company's foreign business is improving, both in volume of sales and realized prices, and it is fair to assume that exports will continue to increase as general business conditions abroad improve."

INCORPORATION

The **Detroit Aluminum & Brass Corporation,** Detroit, Mich., has been organized with a capital stock of $250,000. J. R. Carritte is president and treasurer; L. G. Hooker, vice-president and secretary; P. J. Fobert, production manager of the Bearing Division; Paul Coskey, in charge of babbitting operations; W. M. Cooper, chief engineer; J. P. Carritte, Jr., assistant foundry superintendent and metallurgist. The company will occupy the former Graham Brothers Truck Plant, northeast of the Dodge Brothers plant in Hamtramck, corner of Conant road and Christopher street, Detroit. The lines that will be manufactured are bronze back, babbitt lined motor bearings and brass, bronze and aluminum castings.

METAL STOCK MARKET QUOTATIONS

	Par	Bid	Asked
Aluminum Company of America	$100	$725	$..
American Hardware Corporation	100	88	90
Anaconda Copper	50	37⅝	37¾
Bristol Brass	25	6	10
International Nickel, com	25	28½	28¼
International Nickel, pfd	100	96½	97¼
International Silver, com	100	165	175
International Silver, pfd	100	106	110
National Enameling & Stamping	100	31¾	33
National Lead Company, com	100	151	152
National Lead Company, pfd	100	116½	117¼
New Jersey Zinc	100	185	190
Rome Brass & Copper	100	135	145
Scovil Manufacturing Company	..	224	230
Yale & Towne Mfg. Company, new	..	64	66

Corrected by J. K. Rice, Jr., Co., 36 Wall street, New York.

COPPER OUTLOOK GOOD

John D. Ryan, chairman of the Anaconda Copper Mining Company, before leaving for Europe, repeated his recent statement to the effect that the copper outlook was good.

"The price is still too low to give a satisfactory return to many of the mines," he added, "but that is largely due to the bitter competition that exists in the selling of the metal.

"Nothing is done and nothing can be done under our laws to do away with this competition. In any other commercial country producers that were exporting would be compelled by their governments to get a fair price for such great natural resource."

COPPER PRODUCERS AT FAULT?

Copper producers themselves were chiefly responsible for the recent depression in the price of the metal, according to opinion expressed by Ludwig Vogelstein, chairman of the Board of the American Metal Company, Ltd. This executive laid the recession to the endeavor of the trade to maintain the market at a pegged price at a time when the scale of production seemed to be greater than was warranted by general trade conditions. With this situation partly eliminated by a curtailment of production, the opinion is that prices will improve gradually unless the industry again increases its output. There already has been some improvement.

Review of the Wrought Metal Industry

Written for The Metal Industry by J. J. WHITEHEAD, President of the Whitehead Metal Products Company of New York, Inc.

JUNE 1, 1925.

That portion of the metal industry covering brass rods, tubes, sheets and wire continued to reflect the same condition during the month of May as in April. It is essentially a buyer's market. There seems to be a fair volume of business going, but all of the mills in their anxiety to keep their order books full are cutting prices, and in many instances making ridiculous proposals to the buyers in an effort to stir up orders. This has had the effect of practically eliminating most of the manufacturers' profits.

Many of the mills are running on full time, but with greatly reduced order books, whereas some of them have curtailed their operations to about 70 or 75% of capacity. Buyers on the other hand are withholding their orders until the last minute, and waiting until materials are actually needed before buying. The result is that nearly all business is now being placed on a rush basis. The hand-to-mouth buying policy seems to be in force with almost no firm list of prices available, and apparently no inclination on the part of the mills to hold to firm prices which might stabilize the market. The fact that buyers are withholding their orders right up to the time when material is required has made it impossible for many of the mills to meet the prompt delivery requirements, with the result that the jobbers and metal dealers who carry stocks have profited to a considerable degree, since warehouse and pick-up orders are numerous.

The continued activity in the building trade is responsible for a further large demand for sheet copper and copper conductor for roofing purposes, together with brass pipe and high grade brass materials for plumbing. The demand in the building trade in fact, seems to be increasing rather than diminishing for high class material wherever metal is concerned, and with the preference being given to brass and copper. This is a continued reflection of the campaign of education which has been going on for some time by the manufacturers of brass and copper materials together with the general advertising of the Copper and Brass Research Association. In addition, there is also the continuation of great activity in lines such as automobiles and washing machines.

The nickel business together with the trade in nickel alloys such as nickel silver and Monel metal, continues to present a very startling contrast to the condition above noted. In these lines there is tremendous activity with the result that the manufacturers of nickel silver are reporting delays on deliveries of six to twelve weeks, and manufacturers of pure nickel and Monel metal have a larger order book than ever before in the history of the industry. The prices in these lines are thoroughly stabilized.

In spite of the unsatisfactory condition of the brass and copper business, generally, most of the manufacturers feel that the conditions are only temporary in character, and the day is not far off when there will be a revision of the policies now in force which will have the effect of putting the industry on a more satisfactory level for all.

Metal Market Review

Written for The Metal Industry by METAL MAN

COPPER

JUNE 1, 1925.

Dullness was the feature of the market in May, but the tone was remarkably steady around 13½@13⅝ cents. The market was comparatively stationary for a considerable time, but absence of selling pressure prevented a drift to lower levels.

Increased activity is looked for in the next few weeks. Consumers will need to replenish stocks which have been gradually reduced since the last heavy buying movement. A moderate degree of inquiry and fair sales marked developments in export business. There was apparently little disposition, however, to trade on a very large scale. Domestic consumption is fairly good, but manufacturers meet with intensive competition in taking orders for finished products. Present production shows some curtailment at certain mines and smelters, but it has not yet proved an effective market factor.

ZINC

The present price level shows a gain of fully 30 points compared with quotations early in May. Producers are more reserved in offering lately and values are consequently holding steady. Domestic demand was slightly better recently, but it is not heavy enough to rouse the trade to extensive buying. Foreign inquiry has been displayed lately, but buyers for export hesitate to meet prices asked. Some business, however, has developed from recent inquiries. The tone of market here is fairly firm although there is no special activity to note. The East St. Louis basis is 7.10c for nearby shipment, with business thereat. New York price quotes 7.45c and compares with 7.10c@7.15c on May 1st. A fair amount of business was done a short time ago.

TIN

A conspicuous feature of the tin market lately has been the wide range of prices that has occured during the last 30 days. At the beginning of May Straits tin sold at 52½c for June and July deliveries. There was a sharp decline in London on May 1st which was followed by a corresponding reaction in the New York market. Local interest in the market fell off.

During the last half of May the market developed decided firmness. Speculative bullishness broke out anew at the foreign center and quotations were quickly advanced by the controlling interests at London. New York followed the upward trend, but rather reluctantly and Straits tin sold at 55¼c@56¼c. New York follows London tendency as a matter of course, but buyers display caution in placing orders at current quotations. Market eased off later.

LEAD

By gradual degrees the lead market has worked itself into a strong position again. There was a distinct comeback in the last half of May with price up to 8.40c New York, as quoted by the American Smelting & Refining Company. This figure compares with 7.75c for nearly the first two weeks in May. The leading producer made four price advances last month as orders steadily increased. Demand has broadened out on a large scale, and the outlook is promising for heavy consumption in the next three months. Early shipment lead quotes close to 9 cents owing to scarcity of prompt material and the strong outlook. Recent active buying has placed producers in a comfortable position, and the market is once more in line for further advances if present indications continue.

ANTIMONY

A strong situation in antimony with reference to supplies available for early delivery has given the market a distinctly firmer tone. Chinese prices have advanced to around 14¾c duty paid New York for as late shipment as July and August. Earlier shipment, however, is wanted by trade interests. Stringency of unsold supplies and the strong control of the situation by Chinese holders has brought about much firmer conditions. Chinese regulars for prompt delivery quotes 17c@17¼c duty paid. May June shipment from China quotes 14c duty paid.

ALUMINUM

Demand for aluminum is good and the rapid absorption of supplies is the factor that keeps the market practically unchanged from one month to another. The high rate of activity in automobile output and the free outlet in other directions furnish an active demand for both the domestic and important product. The high grade metal of 99% is in limited supply for prompt shipment. Consumption is expected to be maintained close to present dimensions for the next few months. Present quotations are 28c for 99% plus and 27c for 98-99% Virgin metal.

QUICKSILVER

The tone of the market for quicksilver is firm at around $82.50 per flask. Holders are not inclined to make concessions and although there is no particular activity to note, there is a fair display of stability.

PLATINUM

Sales of platinum are limited and recent prices vary according to quantity involved. Refined quoted $120 an ounce, but this figure could probably be shaded on satisfactory orders.

SILVER

There is some improvement in the market for silver and price is firmer at 67⅞c an ounce. The re-appearance of India as a buyer was a favorable feature in the situation. Trade conditions in China were a little more active but hardly enough to have much influence in silver. Recent stocks of silver at Shanghai were large. India also has very large holdings. United States production of silver in the first four months of this year amounted to 20,641,549 ounces. This compares with 20,837,591 ounces in the first four months of last year.

OLD METALS

The scrap metal situation shows a steady tone to values. Dealers are inclined to believe that prices are near bottom and are not disposed to lower quotations. The lead scraps are firmer in sympathy with better prices for the primary metal. There has been a considerable movement in lead at full prices. Zinc has also been to some slight degree on the uptrend. The copper scraps and the various grades of brass are holding steady. A better demand has developed for export and this outlet is taking a substantial tonnage of material. Prices dealers pay quote 11c@11¼c for heavy copper, 6¾c@7c for heavy brass, 4¾c@5c for battery lead, 8¾c@9c for new brass clippings, 4½c@4¾c for old zinc and 21½c@22c for aluminum clippings.

WATERBURY AVERAGE

Lake Copper—Average for 1924, 13,419—January, 1925, 15.125—February, 15.00—March, 14,375—April, 13,625—May, 13.625.

Brass Mill Zinc—Average for 1924, 7.10—January, 1925, 8.60—February, 8.00—March, 8.10—April, 7.60—May, 7.55.

Daily Metal Prices for the Month of May, 1925

Record of Daily, Highest, Lowest and Average

	1	4	5	6	7	8	11	12	13	14	15	18
Copper (f. o. b. Ref.) c/lb. Duty Free												
Lake (Delivered)	13.75	13.75	13.75	13.75	13.75	13.75	13.75	13.75	13.75	13.75	13.75	13.75
Electrolytic	13.50	13.50	13.55	13.50	13.50	13.50	13.60	13.55	13.50	13.50	13.50	13.50
Casting	13.125	13.125	13.125	13.10	13.10	13.125	13.125	13.10	13.10	13.10	13.10	13.10
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.												
Prime Western	6.80	6.90	6.90	6.925	6.90	6.875	6.95	7.00	6.95	6.925	6.90	6.925
Brass Special	6.90	7.00	7.05	7.05	7.025	7.00	7.05	7.10	7.10	7.10	7.05	7.05
Tin (f. o. b. N. Y.) c/lb. Duty Free												
Straits	53.375	54.00	54.75	54.125	53.875	53.875	54.50	54.50	54.50	54.50	54.25	54.375
Pig 99%	52.50	53.25	54.25	53.50	53.125	53.00	53.50	53.50	53.50	53.625	53.375	53.375
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb	7.40	7.45	7.50	7.50	7.50	7.575	7.625	7.65	7.70	7.80	7.80	7.90
Aluminum c/lb. Duty 5c/lb.	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
Nickel c/lb. Duty 3c/lb.												
Ingot	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00
Shot	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00
Electrolytic	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	12.50	12.50	13.50	15.25	17.00	17.50	17.50	17.50	17.50	17.25	17.25	17.00
Silver c/oz. Troy Duty Free	67.50	67.50	67.75	67.625	67.75	67.75	67.625	67.50	67.125	67.50	67.50	67.25
Platinum $/oz. Troy Duty Free	118	118	118	118	118	118	120	120	120	120	120	120

	19	20	21	22	25	26	27	28	29	High	Low	Aver.
Copper (f. o. b. Ref.) c/lb. Duty Free												
Lake (Delivered)	13.625	13.625	13.625	13.625	13.625	13.625	13.625	13.625	13.625	13.75	13.625	13.696
Electrolytic	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.60	13.50	13.510
Casting	13.10	13.10	13.10	13.10	13.10	13.10	13.10	13.10	13.10	13.125	13.10	13.106
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.												
Prime Western	6.90	6.925	6.95	7.00	7.05	7.10	7.10	7.10	7.10	7.10	6.80	6.961
Brass Special	7.05	7.025	7.05	7.10	7.15	7.20	7.20	7.20	7.20	7.20	6.90	7.079
Tin (f. o. b. N. Y.) c/lb. Duty Free												
Straits	54.375	54.875	55.25	55.125	55.25	55.625	56.25	55.375	55.375	56.25	53.375	54.673
Pig 99%	53.25	54.00	54.375	54.25	54.25	54.625	55.25	54.375	54.25	55.25	52.50	53.768
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb	7.95	8.15	8.25	8.50	8.55	8.55	8.55	8.55	8.55	8.55	7.40	7.952
Aluminum c/lb. Duty 5c/lb.	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
Nickel c/lb. Duty 3c/lb.												
Ingot	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00
Shot	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00
Electrolytic	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	17.00	17.00	16.50	16.50	16.75	17.25	17.25	17.25	17.00	17.50	12.50	16.417
Silver c/oz. Troy Duty Free	67.50	67.25	67.25	67.375	67.875	67.875	67.875	67.875	68.00	68.00	67.125	67.583
Platinum $/oz. Troy Duty Free	120	120	120	120	120	120	120	120	120	120	118	119.429

*Holiday.

Metal Prices, June 8, 1925

Copper: Lake, 13.625. Electrolytic, 13.40. Casting, 13.00.
Zinc: Prime Western, 7.05. Brass Special, 7.15.
Tin: Straits, 55.75. Pig, 99%, 54.75.
Lead: 8.40. **Aluminum,** 28.00. **Antimony,** 16.50.
Nickel: Ingot, 31.00. Shot, 32.00. Electrolytic, International Nickel Company, 38.00.
Quicksilver, flask, 75 lbs., $83.00. **Silver,** oz. Troy, 68.75.
Platinum, oz. Troy, $120.00. **Gold,** oz. Troy, $20.67.

Metal Prices, June 8, 1925

INGOT METALS AND ALLOYS

Brass Ingots, Yellow	10½to11½
Brass Ingots, Red	10¾to12½
Bronze Ingots	12 to13
Bismuth	$2.00to$2.05
Cadmium	60
Casting Aluminum Alloys	21 to24
Cobalt—97% pure	$2.50to$2.60
Manganese Bronze Castings	22 to40
Manganese Bronze Ingots	12 to16
Manganese Bronze Forging	34 to42
Manganese Copper, 30%	28 to45
Parsons Manganese Bronze Ingots	18¼to19¾
Phosphor Bronze	24 to30
Phosphor Copper, guaranteed 15%	18 to21
Phosphor Copper, guaranteed 10%	17¼to20½
Phosphor Tin, guaranteed 5%	65 to70
Phosphor Tin, no guarantee	60 to70
Silicon Copper, 10% ....according to quantity	28 to35

OLD METALS

Buying Prices		Selling Prices
12¼to12½	Heavy Cut Copper	13¼to13¾
12 to12¼	Copper Wire	13 to13½
10¼to10½	Light Copper	11½to12
9¼to 9½	Heavy Machine Comp	10¾to11¼
7¾to 8	Heavy Brass	8¾to 9¼
6¾to 7	Light Brass	8 to 8¼
8¼to 8¾	No. 1 Yellow Brass Turnings	9¾to10
8½to 9	No. 1 Comp. Turnings	10 to10½
8 to 8¼	Heavy Lead	8¾to 9
4¾to 5	Zinc Scrap	5¾to 6
10	Scrap Aluminum Turnings	12 to14
16 to17	Scrap Aluminum, cast alloyed	18 to19
20	Scrap Aluminum, sheet (new)	23 to25
32	No. 1 Pewter	36 to38
12	Old Nickel anodes	14
18	Old Nickel	20

BRASS MATERIAL—MILL SHIPMENTS

In effect April 24, 1925

To customers who buy 5,000 lbs. or more in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.18⅛	$0.19⅞	$0.21⅞
Wire	.18⅝	.20⅜	.22⅜
Rod	.15⅞	.20⅜	.22⅝
Brazed tubing	.26½	.....	.31⅝
Open seam tubing	.26½	.....	.31⅝
Angles and channels	.29⅛	.....	.34⅝

To customers who buy less than 5,000 lbs. in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.19⅛	$0.20⅞	$0.22⅞
Wire	.19⅝	.21⅜	.23⅜
Rod	.16⅞	.21⅝	.23⅝
Brazed tubing	.27⅛	.....	.32⅝
Open seam tubing	.27⅛	.....	.32⅝
Angles and channels	.30⅛	.....	.35⅝

SEAMLESS TUBING

Brass, 22¾c. to 23¾c.
Copper, 23¾c. to 24¾c.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	20⅛c. net base
Muntz or Yellow Metal Sheathing (14"x48")	18⅛c. net base
Muntz or Yellow Rectangular sheet other Sheathing	19⅛c. net base
Muntz or Yellow Metal Rod	16⅛c. net base

Above are for 100 lbs. or more in one order.

COPPER SHEET

Mill shipments (hot rolled)	20¾c. to 21¾c. net base
From stock	21¾c. to 22¾c. net base

BARE COPPER WIRE—CARLOAD LOTS

16c. to 16¼c. net base.

SOLDERING COPPERS

300 lbs. and over in one order	20¼c. net base
100 lbs. to 200 lbs. in one order	20¾c. net base

ZINC SHEET

Duty, sheet, 15%	Cents per lb.
Carload lots, standard sizes and gauges, at mill, less 8 per cent discount	10.00 basis
Casks, jobbers' price	11.25 net base
Open Casks, jobbers' price	11.75 to 12.00 net base

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga., base price	40c.
Aluminum coils, 24 ga., base price	36.70c.
Foreign	40c.

NICKEL SILVER (NICKELENE)

Net Base Prices

Grade "A" Nickel Silver Sheet Metal

10%	Quality	25¾c.
15%	"	27¼c.
18%	"	28¼c.

Nickel Silver Wire and Rod

10%	"	28¾c.
15%	"	32¼c.
18%	"	35½c.

MONEL METAL

Shot	32
Blocks	32
Hot Rolled Rods (base)	40
Cold Drawn Rods (base)	48
Hot Rolled Sheets (base)	42

BLOCK TIN SHEET AND BRITANNIA METAL

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 10c. over Pig Tin. 50 to 100 lbs., 15c. over 25 to 50 lbs., 17c. over, less than 25 lbs., 25c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. to 500 lbs., 10c. over Pig Tin. 50 to 100 lbs., 15c. over, 25 to 50 lbs., 20c. over, less than 25 lbs. 25c. over. Above prices f. o. b. mill.

SILVER SHEET

Rolled silver anodes .999 fine are quoted at from 71¼c. to 73¼c. per Troy ounce, depending upon quantity.

Rolled sterling silver 68½c. to 70½c.

NICKEL ANODES

90 to 92% purity	43 c.-45 c. per lb.
95 to 97% purity	45 c.-47 c. per lb.

Supply Prices, June 8, 1925

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.12–.16
Acid—		
Boric (Boracic) Crystals	lb.	.12
Hydrochloric (Muriatic) Tech., 20°, Carboys	lb.	02
Hydrochloric, C. P., 20 deg., Carboys	lb.	.06
Hydrofluoric, 30%, bbls	lb.	.08
Nitric, 36 deg., Carboys	lb.	.06
Nitric, 42 deg., Carboys	lb.	.07
Sulphuric, 66 deg., Carboys	lb.	.02
Alcohol—		
Butyl	lb.	.25¾–.29¼
Denatured in bbls	gal.	.60–.62
Alum—		
Lump Barrels	lb.	.04
Powdered, Barrels	lb.	.04½
Aluminum sulphate, commercial tech	lb.	.02⅜
Aluminum chloride solution in carboys	lb.	.06½
Ammonium—		
Sulphate, tech., bbls	lb.	.03¾
Sulphocyanide	lb.	.65
Argols, white, see Cream of Tartar	lb.	.27
Arsenic, white, kegs	lb.	.16
Asphaltum	lb.	.35
Benzol, pure	gal.	.60
Blue Vitriol, see Copper Sulphate.		
Borax Crystals (Sodium Biborate), bbls	lb.	.05½
Calcium Carbonate (Precipitated Chalk)	lb.	.04
Carbon Bisulphide, Drums	lb.	.06
Chrome Green, bbls	lb.	.34
Cobalt Chloride	lb.	—
Copper—		
Acetate	lb.	.37
Carbonate, bbls	lb.	.17
Cyanide	lb.	.50
Sulphate, bbls	lb.	.05¼
Copperas (Iron Sulphate, bbl.)	lb.	.01½
Corrosive Sublimate, see Mercury Bichloride.		
Cream of Tartar Crystals (Potassium bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05–.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$75.00
Fusel Oil	gal.	$4.45
Gold Chloride	oz.	$14.00
Gum—		
Sandarac	lb.	.26
Shellac	lb.	.59–.61
Iron, Sulphate, see Copperas, bbl	lb.	.01½
Lead Acetate (Sugar of Lead)	lb.	.13
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.15
Nickel—		
Carbonate dry, bbls	lb.	.29
Chloride, 100 lb. lots	lb.	.22½
Salts, single bbls	lb.	.10½
Salts, double bbl.	lb.	.10
Paraffin	lb.	.05–.06
Phosphorus—Duty free, according to quantity		.35–.40
Potash, Caustic Electrolytic 88-92% fused, drums	lb.	.08¾
Potassium Bichromate, casks	lb.	.08¾
Carbonate, 80-85%, casks	lb.	.05¾
Cyanide, 165 lb. cases, 94-96%	lb.	.57½
Pumice, ground, bbls	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls	lb.	.03
Rouge, nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.08
Silver Chloride, dry	oz.	.86
Cyanide (Fluctuating Price)	oz.	.65
Nitrate, 100 ounces lots	oz.	.48
Soda Ash, 58%, bbls	lb.	.02½
Sodium—		
Biborate, see Borax (Powdered), bbls	lb.	.05½
Cyanide, 96 to 98%, 100 lbs	lb.	.22
Hyposulphite, kegs	lb.	.04
Nitrate, tech., bbls	lb.	.04¼
Phosphate, tech., bbls	lb.	.03¾
Silicate (Water Glass), bbls	lb.	.02
Sulpho Cyanide	lb.	.45
Soot, Calcined	lb.	—
Sugar of Lead, see Lead Acetate	lb.	.13
Sulphur (Brimstone), bbls	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.39½
Tripoli, Powdered	lb.	.03
Verdigris, see Copper Acetate	lb.	.37
Water Glass, see Sodium Silicate, bbls	lb.	.02
Wax—		
Bees, white ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½–.06
Zinc, Carbonate, bbls	lb.	.11
Chloride, 600 lb. lots	lb.	.08
Cyanide	lb.	.41
Sulphate, bbls	lb.	.03½

COTTON BUFFS

Open buffs, per 100 sections (nominal),

12 inch, 20 ply, 64/68, unbleached sheeting			base,	$32.40-$40.85
14 inch, 20 ply, 80/96,	"	"	base,	45.25- 50.80
12 inch, 20 ply, 80/96,	"	"	base,	47.35- 46.20
14 inch, 20 ply, 84/92,	"	"	base,	63.15- 62.25
12 inch, 20 ply, 88/96,	"	"	base,	63.25
14 inch, 20 ply, 88/96,	"	"	base,	85.15
12 inch, 20 ply, 80/96,	"	"	base,	52.70
14 inch, 20 ply, 80/96,	"	"	base,	70.80

Sewed Buffs, per lb., bleached and unbleached. base, .55 to .75

FELT WHEELS—VARIOUS BRANDS

		Price Per Lb. Less Than 100 Lbs.	300 Lbs. and Over
Diameter—10" to 16"	1" to 3"	$3.00	$2.65
" 6" 8" and over 16"	1" to 3"	3.10	2.75
" 6" to 24"	Over 3"	3.40	3.05
" 6" to 24"	½" to 1"	4.00	3.65
" 4" to 6"	¼" to 3"	4.85 }	Any quantity
" Under 4"	¼" to 3"	5.45 }	

	6" to 18"	Over 18"	Under 6"
Over 3"	$3.00	$3.30	$3.75
1" to 3"	2.60	2.70	3.75
Under 1"	3.30	3.60	3.75

Grey Mexican or French Grey—10c. less per lb. than Spanish, above.